The
GEOGRAPHICAL JOURNAL

Vol LXXXI No 6 R.G.S. *June 1933*

AMONG THE MOUNTAINS AND HEAD-HUNTERS OF FORMOSA: *A paper read at the Evening Meeting of the Society on 3 April 1933, by the*

REV. W. H. MURRAY WALTON

A PAPER on the Mountains and Head-hunters of Formosa should perhaps begin with the origin both of the mountains and their inhabitants. But as I am more of a traveller than a scientist, and much of what I shall say has reference to the spiritual and physical exercise called mountain climbing, it were better perhaps that I gave, shall I say, the artistic explanation of the origin of that island. Modern science bids us look back into the immeasurable past for the origin of present phenomena; this explanation too can claim the authority of antiquity. According to an old Chinese legend two dragons who lived in the neighbourhood of the city of Foochow decided one day to have a bathe. Being accustomed by their nature to a somewhat heated existence, they found the cool waters of the Pacific very pleasant, and in their resultant frolics churned up the bed of the ocean floor to such effect that they left behind them a great mass of land so beautiful that Portuguese explorers centuries later greeted it with the words "Ilha Formosa"—island beautiful.

We are perhaps on surer ground when we consider the origin of the islanders, though in this matter also we are dependent on Chinese history. In certain very early records mention is made of the visit to the Imperial Court of envoys—"barbarians from the island"—who brought with them, as tribute, coats bordered with shells such as the Taiyals of Formosa wear to-day. But they, in turn, may have come originally from the larger islands to the south, descendants of fishermen whose boats were driven north by wind and storm. Both in features and custom they bear striking resemblance to the head-hunters of Malay. Indeed some of the tribes have such a tradition. One on the East Coast keeps two canoes which are paddled out a short distance every year and are then turned and rowed back to the shore, where they are welcomed by the remainder of the tribe amid scenes of the wildest enthusiasm. Another tribe, the Yami, have high-prowed boats similar to those of the Polynesian islanders which would suggest some affinity. But whatever their origin the nine tribes, comprising some 130,000

people, offer an extensive field to the anthropologist, and it is good to know that Japanese scholars are already at work on this subject.

The island of Formosa lies some 500 miles south-west of Japan proper and about 100 miles from the Chinese coast. Its length is 240 miles and its greatest breadth is 80 miles. The western half of the island and a narrow strip to the south-east is flat and fertile, while the remainder is mountainous and covered with dense and luxuriant forest. It is in this latter part that the head-hunters make their home. Considering the size of the island the mountains are remarkably high. It contains at least the five highest peaks in the Japanese Empire. We say "at least," for although maps of the mountainous area exist, they are not all accurate; indeed it is only in recent years that a survey on modern scientific lines has been started. The two highest peaks are now called Niitaka, "new high" (12,960 feet), and Tsugitaka, "next high" (12,897 feet). They are better known to the West as Mount Morrison and Mount Sylvia respectively, the former after a British sea-captain who visited the island in the middle of the last century, the latter after a survey ship, H.M.S. *Sylvia*, which in 1867 surveyed the mountain from the sea. As a result of the recent survey by the military authorities Niitaka has been shorn of some 50 feet; it remains to be seen whether a proper survey of Tsugitaka will give "the next peak" first place.

I must pass over the subject of Formosa's political history. At one time it very nearly became a part of the British Empire. It now belongs to Japan and is one of her most valuable colonial possessions. There is a special department entrusted with the oversight of aboriginal affairs, from whom leave must be obtained to enter the savage area, and I may say at this point that one thing which impressed us during the weeks we spent in Formosa was the admirable way the authorities through their special police fulfilled their trust. The relations that existed between the mountain police and their charges were more that of parent and child than of master and servant. As we are conversant with the Japanese language we were able to appreciate this more than the casual visitor, and we are glad to be able to bear this testimony. Our only regret is that the authorities do not yet allow religious work of any kind among these people; but doubtless Japan, in accordance with her enlightened policy elsewhere, will ere long remove this restriction. The police are endeavouring to get the savages to give up their scattered and nomadic existence, settle down in villages, and take up agriculture. Their efforts have already met with considerable success. At one police post we found a cabbage show in full swing with practically every house entered. Many of the larger centres have "Education places," as the schools are called, and in some of them there are dispensaries and resident doctors. Hunting however is still the most popular occupation, and while guns must be borrowed from the police, bows and arrows and spears are common. The police posts are scattered all over the savage area, and are linked up to one another by paths and telephones. All the higher officers are Japanese, but both Formosans and savages hold junior posts.

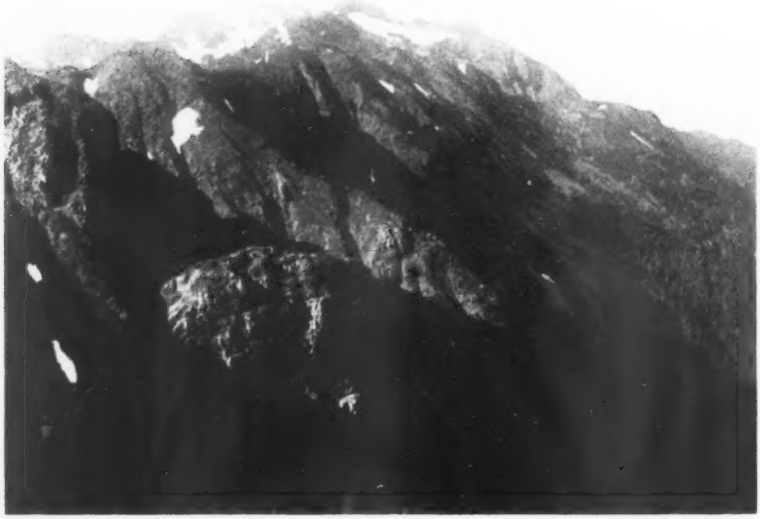
Head-hunting as such has virtually ceased. In 1930, at the time of our visit, only a section of one small tribe had not yet made their submission. But there is still the danger of sporadic outbursts. Within three months of

The Head-hunter village of Shikayau

Porters drinking by pairs to celebrate the return from Tsugitaka

Phot. K. A. C. Gross

Nankotai (left) and Chuosen (right) from Tsugitaka ridge showing relative heights



Phot. K. A. C. G.

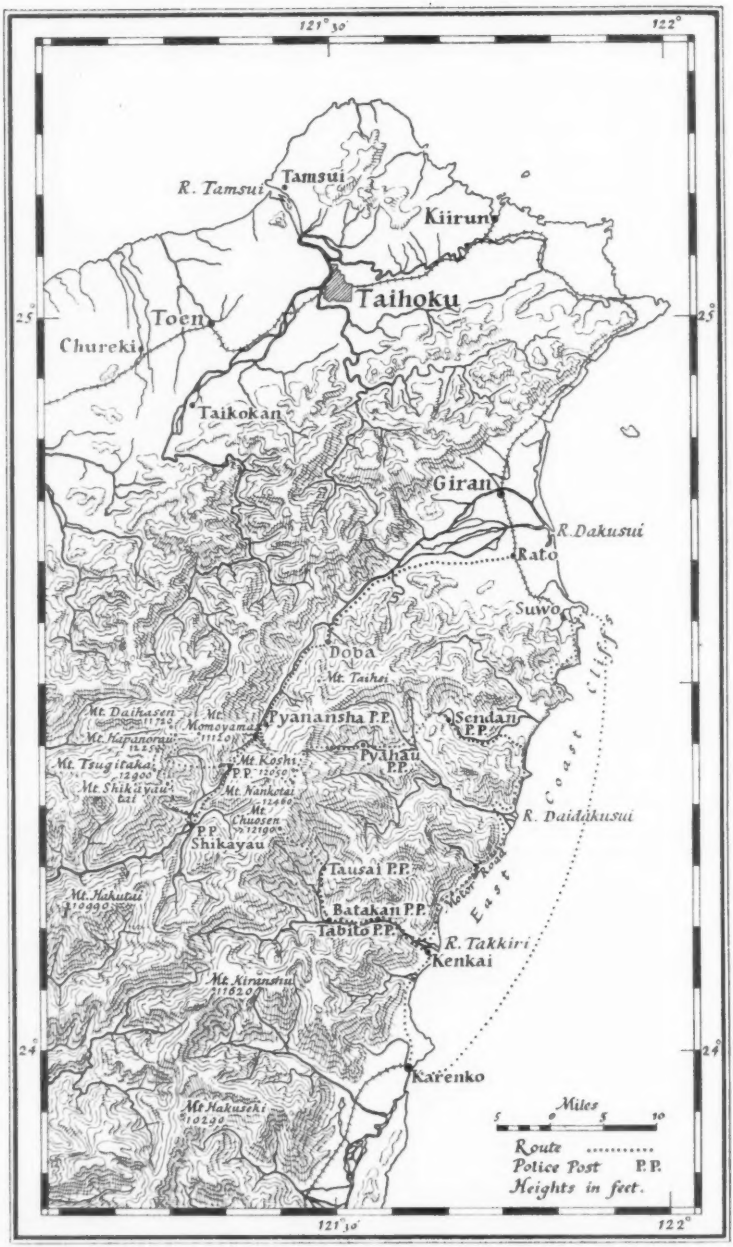
Western face of the Tsugitaka massif: summit in background

our departure, at one police post over one hundred Japanese were murdered; but such incidents are certainly exceptional.

During the six weeks that my colleague, Mr. K. Gross, and I were in the mountains we received every courtesy and attention from all alike, and in this respect we are much indebted to His Excellency, Sir John Tilley, late His Britannic Majesty's Ambassador to Japan, and to leading officials in the Formosan Government, especially to Mr. C. Koshimura, now head of the Department of Foreign Affairs in the Island. The officers of the Formosan Mountaineering Club also gave us every assistance. Our plans were to climb in some of the lesser known mountains of the island, and to this end we decided to concentrate for the greater part of our time on some of the peaks in the north-east, of which Tsugitaka is the highest. It is about these peaks that I would speak to-day.

Most of these mountains are still entirely unknown to the Western world, and indeed several of them are still virgin peaks. A network of police paths covers the ranges, but once you leave them you are in unknown country. In some places hunting-paths exist, and as a result of the activities of the Formosan Mountaineering Club new routes are continually being opened up. But when it is remembered that up to a few years ago most of this territory was quite inaccessible on account of the head-hunting habits of its inhabitants, its unexplored character will be readily understood. A survey was made by a Japanese newspaper with Government support over thirty years ago, which in broad detail is fairly correct, but it is of a very different standard from that now being pushed forward by the military authorities. This may explain perhaps the very inaccurate figures which exist in various works on Formosa. In one of the most recent encyclopaedias the stated height of Niitaka shows a difference of 2000 feet from the real height. The dense forests which cover the mountain sides and are a special feature of Formosa make them difficult of access, while the deep and precipitous valleys which penetrate them from the East Coast make them inaccessible from beneath. In places however the ranges are broken by valleys greater in width and bounded by slopes of gentler gradient, and these constitute the highways through the mountain area. No physical difficulty however has been allowed to obstruct the construction of police paths where needed, and some of them indeed are remarkable feats of engineering. The East Coast Road, of which more later, is the most conspicuous example.

We decided to make Mount Tsugitaka our first objective. This peak had been climbed by a few parties of Japanese and by one foreigner, Herr Grubler, of Hokkaido University, who succeeded in making the ascent some six months before us. In the neighbourhood of Tsugitaka were two other high peaks, Nankotaisan and Chuosenzan, both well over 12,000 feet. These two mountains were connected by a long narrow ridge, utterly unknown, and we had hoped that it might be possible to traverse it, but unfriendly relations between the tribes at either end made this impossible, with the result that we had to make an eight-day detour. In the neighbourhood of Tsugitaka there is another peak known as Daihasenzan, whose shape is not unlike that of the mountain so vividly described in Conan Doyle's 'The Lost World.' It had been climbed for the first time two years before by a small Japanese party. Our programme



Mr. Murray Walton's route in north-eastern Formosa

was to climb Tsugitaka, make our way if possible along an unknown ridge to the north as far as Daihasenzan, and descend to our starting-point; then to strike east and climb Nankotaisan, ending on the East Coast; and then after a march south to strike inland once again and climb Chuosenzan from the east. We estimated that this would take us the greater part of a month.

Accordingly we left Taihoku, the capital of Formosa, early one May morning by the train which skirts the north of the island, and which would bring us to within two days' march of the base of Tsugitaka. At Rato we changed into a light railway which has been laid to bring down the timber from the slopes of Taiheizan, where there are extensive forestry works. Halfway up this line we entered savage territory and we were joined by the local chief of police who had spent the greater part of his life among the savages. From him we were able to learn something of the customs of the group of Taiyals among whom we were.

Our talk naturally drifted on to those great events in the lives of human beings—birth, marriage, and death. At child-birth the mother is left entirely to herself. Her husband is not allowed near, and only in exceptional cases is her mother permitted to be with her. A rope is suspended from the roof for her to hold during her dread experience; but once it is over recovery is rapid and the odds are that she will be back at work in the fields two or three days later with the baby on her back. It should be mentioned that the woman does most of the agricultural work as well as the domestic; her lord's pleasure is to hunt animals now that human heads are no longer allowed.

With regard to marriage the initiative rests with the bridegroom. He intimates to some trusted member of the tribe his desire for a wife; he may even drop a hint as to whom he wishes the lady to be. Then while his deputy goes forth to make the proposal he stays at home and brews wine in anticipation of a successful result. In the meantime the lady is being interviewed and, whatever her secret desire, is loud in her protests against matrimony. If however she allows herself to be persuaded, the successful suitor posts off home as fast as he can with the welcome news. The bridegroom's parents then appear on the scene and an interview is arranged with the prospective "in-laws" and terms are agreed upon. The promise is solemnly sealed by the several parties dipping their fingers into water in a bamboo cup. The father and mother return with the bride-to-be, and next day in the presence of the parents of both parties and of their friends the marriage is celebrated in a convivial manner. The bride does not take her husband's name unless he happens to die early, but any children born of the marriage do so. Divorce is practically unknown, indeed the moral standards of the savages are exceptionally high. It was this difference in custom between Japanese and savage which was in part responsible for the outbreak in 1930, for certain Japanese had married savage women and then divorced them—a proceeding in flat defiance of all savage ideas. In case of barrenness a child is sometimes adopted from another family.

On the occasion of a death the custom was to wrap the body of the deceased in his every-day clothes and bury him 4 feet or so below a corner of the floor of the hut. When all four corners were thus occupied, the hut was abandoned. The Japanese have now forbidden this practice and are trying to instil more hygienic methods.

While on the subject of customs a word should be said about that one which gave the head-hunter his name. To the savage head-hunting has no moral implication. On the contrary, so far from being immoral it was deemed worthy of the highest praise, as by it the young brave was able to give proof of his manhood. Men were not allowed to take the heads of members of their tribe, but apart from this there were no game laws, no close season. Chinese heads were considered a special trophy. Two suitors for the hand of one girl would settle the matter by seeing who could get a head first. Though no particular courage might be required, yet a big collection was almost certain to secure their owner a high place in the ranks of the tribe. This cruel practice is all the more remarkable considering that in other matters the standards of savage morality are remarkably high.

The terminus of the light railway is the hot spring of Doba. Whether the proprietor's experience in married life tallied with that of Socrates we do not know, but at all events the hotel is almost unique in Japan—no woman is allowed under its roof. Next morning as we were waiting for our porters to arrive we watched the timber being shot down the cables from the heights above—great massive logs, 6 feet or so in diameter. After some delay our carriers arrived, eight in all. One was a man, two or three were boys, the rest were women. We had never had women porters before, but our guard assured us that it is a common practice in Formosa, and indeed that they make rather better carriers than the men. We noticed that "my lord" took care to choose the lightest load for himself. The method of carrying baggage is to wrap it in a big hempen cloth brought for the purpose, sling it on to the shoulders and support it by a web passing over the forehead. We had not proceeded very far on our way before we had our first grim reminder of the days of conflict in the shape of a grave post to four Japanese police who had lost their heads to the savages in 1914. How much things have altered was evidenced shortly after by a small cottage in which dwelt a Chinese family that made a living by distilling camphor.

We reached our destination, the police post of Pyanansha, as dusk fell. It stands on a high bank above the valley and we could see the figures of the savage children on the look out, silhouetted against the evening sky. They had heard of our coming and had been on the watch for hours. By the time we reached our quarters we realized that we were inescapably in the public eye. Dressing, undressing, bathing, eating—we were subjected to the closest scrutiny. We had our revenge however. Among our provisions was a cheese in a spherical tin. We opened this, and thinking that the two halves might be of some use in a savage kitchen, gave them to our tormentors. The next thing we saw was a fat old woman swaggering about with the last word in Paris hats. It was labelled "Fine old Dutch."

Our next day's march was to the post of Shikayau, at the base of Tsugitaka. This involved crossing a pass some 6000 feet in height, from whose summit we got a momentary glimpse of the long broad valley we had traversed the day before. Another post stands just over the summit known as Pyanan Ambu, where there is a small shop under police supervision. Here we purchased supplies for our men. Normally porters provide their own food, but on account of the failure of the crops we were asked to help in this matter. Wages

Daihasenzan: height above ridge 500 feet

Nankotai from the west

Entrance to the Takkiri Gorge, with suspension bridge

Phots. K. A. C. G.

Suspension bridge, Takkiri Gorge

are about seventy sen or one shilling and sixpence a day, as compared with three to four times that amount in Japan.

At Shikayau the same cordial welcome awaited us as we had received the night before. The post is an important one, as there are two villages of considerable size hard by. As the weather for the next two days was bad we took the opportunity of seeing something of the savages at home. Cleanliness is not reckoned a virtue. Pigs and fowls, ducks and mangy dogs, wandered about freely. Flies were a plague. The paths between the houses were thick with mud. The houses themselves left much to be desired. Professor Trevelyan's description in his history of England of the homes of our ancestors would apply closely to them: "The villeins' cottages were still hovels, without chimneys or glass, and sometimes without any aperture but the door. They were built of split logs, erected side by side in the old Saxon fashion. The roof was of thatch." The floor of a head-hunter's home is of earth and generally below the level of the ground outside. The furniture is simple—a wooden mortar for grinding grain, a few baskets, a sword or two, some plain earthenware jars, and in each corner a fixed bed fitted with a wicker mattress. One of these is for men, another for women, and a third for children.

After the loss of two valuable days the weather cleared sufficiently for us to make a start. Our party consisted of three climbers, a bodyguard of two police and four servants, all armed, and eight or nine savages. There was a slight delay in the village below Shikayau, as we were one carrier short. But finally an old woman was inveigled into coming. It seemed almost cruel to employ her, but she could give most of us points before the trip was over. We dubbed her the scavenger. There was no fear of leaving litter when she was about. By the end of the climb she had the finest collection of old tins in the tribe.

Our route led down to the bottom of a deep ravine. The river had subsided somewhat since the day before, but it was the savage bridge which was the exciting thing. These bridges are of peculiar design. Great branches are bent into the form of an arc of a circle and the ends on either side of the stream are made fast in stone heaps on either side. What would happen to the person at the end if this catapult bridge suddenly went off may be left to the imagination.

After crossing the main stream we followed a tributary for an hour or so and then struck up one of the shoulders of Shikayautaisan (11,160 feet), a peak somewhat east of Tsugitaka. It was an easy though tiring climb, and we were not sorry to reach a small tarn about lunch time. The view of the summit of Tsugitaka from this mountain is particularly fine. On the right great belts of alp fall away to the forest beneath, to the left the mountain seems to crumble into precipice, while here and there a buttress of trees juts out like a rugged promontory into the sea of clouds below. Ahead and rising above another belt of grass and forest land are the rocky crags of the peak itself. The Tsugitaka hut lies in the forest immediately below these. It had only been put up by the police a few months before, but the winter snows had made short work of this invader of their solitude. We reached its ruins an hour before dark, and the porters, who seemed absolutely tireless, went off immediately on the hunt. A few shots rang out, but they returned later with nothing to show.

We made an early start next day for the final 2000 feet to the summit. For

an hour we toiled up the steep and rocky bed of a mountain stream, into whose bosom the sun had not yet penetrated. There was a thick forest on either side, which made it darker still, but far above could be seen patches of sunlight on the rocks and snow. The timber line in Formosa is in some places as high as 12,000 feet, about 3000 feet higher than that in Japan. Once out of the forest we found ourselves within measurable distance of the top, and though the creeping pine put up a stout resistance we reached our goal in two hours from the hut. The Formosan creeping pine is more formidable than its Japanese cousin, for it adds to its tough twisted branches the attraction of prickly leaves.

Tsugitaka, 12,897 feet, is the second highest mountain in the Japanese Empire. It consists of two peaks nearly a mile apart at either end of a long ridge. According to barometric observation the northern one is some 40 feet higher, but the whole mountain is in need of a fresh survey. To the south Tsugitaka falls away in a series of huge precipices; to the north it stretches in a long serrated ridge of some 5 miles before taking a sweep to the east culminating in the peak of Momoyama, 11,123 feet. Just after completing the bend to the east another ridge branches north and ends in that remarkable peak, Daihasenzan, to which I have already referred. Visibility was only fair, which was unfortunate, as we had been asked among other things to try and ascertain whether the high peak visible from Taihoku was Tsugitaka itself. Our impression was that it was not, and we hear that later climbers have confirmed this. There was a considerable amount of snow on the summit, more indeed than on any other peak we climbed; but it fell far short of what there is in Japan at considerably lower altitudes. The intervening ridge between Tsugitaka and Daihasenzan, so far as we could ascertain, had never been traversed before, certainly by civilized man. It is true that it is depicted in certain maps, but the contours therein bear little resemblance to the actual.

For the next six hours we made our way through belts of creeping pine, across snowfields, up spurs of rock and down falls of scree. The precipices to the west were bigger than anything I had seen in Japan. Finally gathering clouds made progress impossible, and we decided to camp. It was fortunate, as we had reached a high ridge which a few hundred yards ahead fell away in a vast precipice, while the main ridge lay below on the right. We were at a height of about 12,400 feet and were fortunate in finding an ideal place to camp.

Next morning was gloriously clear. A long low horizontal cloud shut out the lower flanks of Nankotaisan and Chuosenzan to the east, but their summits stood out with majestic clarity, each 14 miles away. A photograph we took of them was later to prove a valuable bit of scientific evidence as to their relative height. According to the maps Nankotai is some 140 feet higher than its neighbour. The photo, on the other hand, made Chuosen clearly the higher peak. Mr. T. Kano, who climbed the mountain the year before we did, by barometric observation estimated it to be just short of 12,600 feet, or 270 feet higher. The picture would suggest that he was right. If this be so, Chuosenzan is the third highest peak in Formosa.

We could now see where we were, and instead of following the ridge to its sudden ending, we dropped down to a col 1000 feet below on the right, and then started the arduous ascent of Mount Hapanorau. This brought us to

some of the finest scenery of the whole trip and demands more than a passing word. The ridge rises very abruptly from the col to a series of jagged edges along the summit. We made our way up a steep shoulder and through an all but impenetrable belt of creeping pine, which with sharp spurs of rock disputed every foot of the way. At last we reached the lower end of the ridge and looked over. There, 1000 feet below us, in a clear drop, was a torrent of fallen rocks forcing their way with the slow motion of the ages down a narrow gorge into the green of the lower ranges.

We had now reached what is the goal of every mountaineer, a virgin peak. Our bearers said that it was known as Hapanorau, but later we heard that other tribes called it Shimita, and this latter name was finally adopted by the Formosan Mountaineering Club. Its height is about 12,250 feet. Its northern face is an overhang of about 1200 feet. We were now nearing the point where the ridge breaks off to the north to Daihasenzan. Between us and the junction was what seemed from Tsugitaka to be but a slight drop. Numai and two carriers went ahead to reconnoitre, and after quite a creditable bit of rock work reached a point of vantage from which they could make a careful survey. A note was sent back. The "slight dip" was a precipice of several hundred feet which, to the men at all events, was quite impossible. The only thing was to attempt a detour. But there we made a mistake: we allowed the savages to scatter too much. Some made a plunge down and through the creeping pine, others followed a route along the face of the cliff which I had chosen myself, others tried a mixture of both, with the result that when we finally collected once more it was to find us on the opposite side of a deep ravine which separated us from our goal. To retrace our steps was impossible as the afternoon was late, so we made down the face of the mountain to the bed of a stream just below the "great divide," and there pitched our camp.

That night Numai and I did the round of the camp fires to see how our men were standing the effort. The savages had divided into three small parties, family parties I learnt, each with their own fire and cooking-pot. We took with us a supply of sweets, for the savage is sweet-toothed. The "scavenger" got the tin. We learnt that night something more of the hunting rules of the tribes. The Japanese authorities have defined the area of each tribe and no trespassing is allowed without a police permit. Any game secured by the member of one tribe in the area of another must be handed over; it may not be kept. There is always great rejoicing when a deer is secured as the horns fetch a good price. While hunting the savage is more or less naked, but he carries a small square of cloth for use at night. Food is carried in flat baskets in shape not unlike a large bun. The basket work is so close as to be watertight. When cooking is necessary three sticks are stuck firmly into the ground rather like the sides of an inverted pyramid with its apex in the earth, and the pot rests between them.

Next day we found that the gorge was quite impassable, and after various attempts at getting round, abandoned the attempt and after one more night in the open finally reached the Pyanan Ambu police post which we had passed nearly a week before. Next day we paid off our carriers. Gross and I gave them some coloured wool and rubber sandals; with their natural leather ones they seemed rather superfluous, but we were told they are very acceptable.

The women were more than satisfied with pots of face cream, while the whole party drank our health in *saké*, two by two out of a single cup, as a token of good will. Three hours later we were with our police friends at the Pyanansha police post. The ridge which had baffled us was conquered the following year by three members of the Formosan Mountaineering Club, who went out specially equipped for the purpose.

Pyanansha lies some 25 miles inland from the famous East Coast of Formosa. Between it and the sea lay a range of mountains running up to well over 12,000 feet with the two great peaks of Nankotai and Chuosen. These were our next objective. Our plan was to climb Nankotai and make what is known as a col of the peak, descending the other side to the coast and then, after following the road for some 20 miles, to strike inland once again and climb Chuosenzan.

After an easy morning we set out for the first stage of our ascent. Our immediate goal was a little savage hunting-box about 4000 feet up the lower slopes of Nankotai. As we were now in the territory of a different tribal group, a fresh supply of carriers was engaged, who had been brought over the mountain by the police entrusted with our care. They were certainly not an attractive lot—dirty, uncouth, not over friendly, and clad in the scantiest of clothes. We were not surprised to learn that they belonged to a tribe which had only been tamed a few years! Numai unfortunately had had to return, but his place was taken by Mr. Inoue of the Government Secretariat Department and one of the secretaries of the Mountaineering Club. The site of our bivouac was ideal with the distant ridges of Tsugitaka silhouetted against the sunset sky. We were away early next morning and were soon once more in the forest. We were much interested in seeing the way in which the men rested: a word, and in a moment loads were off and pipes were out; another word, and instantly all were on the march again. After a steady climb of three hours we emerged at a height of 10,200 feet on one of the western slopes of Nankotai. The peak lay in front of us, a massive pyramid of rocks, tumbled together in confusion. Between ran a deep ravine whose bottom we could not see. The shoulder on which we stood bore away and up to the left to a subsidiary peak known as Koshi, and then with one magnificent semicircular sweep culminated in the final peak itself.

For another hour we tramped on, now through the forest, now across open pasture land, until we reached a small stream with a possible site for camp near by. Here we pitched our tent and took a short siesta, which, as Leslie Stephen has reminded us, "amongst the mountains belongs to a finer growth"! One of our guard, who had made the ascent from this point before, said that it was only a matter of three hours there and back. By the time we had finished we had come to the conclusion that time and space are not ultimately the same thing.

I wonder whether the mountains of Europe contain anything to equal the rhododendrons of Nankotai. Mountain flowers in Formosa on the whole are not so common as those in Japan proper, partly on account of the greater height of the timber-line, but I have seen nothing anywhere to compare with the Alpine Roses on this peak. Even the famous Rhododendron Walk at Howth pales into insignificance before them—great masses of pink blossom

and white bud, in a setting of deep green and dark brown, scattered on the mountain side in prodigal confusion, peering unexpectedly from the shelter of the rock, or thrusting long sinuous fingers into the cleft of the precipice. Next day we looked back on the steep face of its northern shoulder: it was white like snow with this mountain bloom.

As we slowly mounted from our camp, the spurs of rock gradually became more frequent, and finally we found ourselves on the rugged summit of Koshi (12,052 feet), looking across the narrow entrance of a magnificent amphitheatre to the final arête of Nankotai. Even the great cirques on Yarigatake in Japan were small in comparison.

Two routes now lay before us. We could make our way laboriously round the "tiers" which finally led to the peak itself, or we could plunge boldly down a sweep of loose scree to the "pit" and then climb the rocks on the other side. We chose the latter, and three hours after leaving camp we stood on the summit, 12,458 feet above the sea. Unfortunately the last hundred feet were under cloud.

The ascent had taken so long that we realized that we could not make camp again before darkness fell, so a savage was dispatched back post haste to get lights and come and meet us, and finally after an exciting scramble, in the course of which one of the party was taken ill, we reached camp none the worse for our adventure. One of our carriers however was missing, but his companions seemed to show little concern. Next morning he turned up safe and sound with a freshly killed mountain goat, which the party proceeded to eat raw.

Time does not allow me to describe the long descent next day to the police post of Pyahau, where we were greeted by a dusky warrior who must have collected many heads in his day, and whose grandchildren were with an even greater enthusiasm collecting "home runs" in the school quad hard by. It was indeed a sight that I will not quickly forget: young Formosa, clad in a minimum of clothing, going through all the correct poses and making the correct cries of the baseball expert, and giving promise of that day when their representatives will appear at the Olympic Games. Apparently school is equally popular, for there was an average attendance of 107 out of the 117 on the books.

The next day's march was from Pyahau to Sendan, a distance of over 30 miles, along mountain paths and under a very hot sun. We saw many examples of the thoroughness with which Japan is giving herself to the development of these primitive folk—schools, bridges, roads, medical clinics, and now shops under police supervision. We also were not allowed to forget the price that had been paid, for at one spot and another our guards pointed out where the early pioneers had met their fate at the hands of a savage people. As usual we were handed on from station to station by our police hosts. On one occasion we observed an amusing example of the magnificent self-restraint of the Japanese. Our companion over one section during the hottest part of the day was an elderly police inspector of some sixty years. When we reached the divisional point the policeman who should have been waiting for him was not there. Without a murmur he walked a further 2 miles until he met the latecomer, to whom he handed us over without so much as a word of reproof.

We had not left Pyahau very long before we killed our first poisonous snake, a 4-foot cobra. We were destined to hear more about snakes however before the day was over, for when we started on the last lap of our journey, just as darkness was falling, we noticed that our escort armed himself with a stout stick and proceeded somewhat slowly. We asked what was up. "Oh, this section of the path is notorious for the *hyappodachi* who often come out of their holes at this time and bask in the cool of the path. I have seen as many as a dozen in a single hour." Like Agag, we walked delicately, for the *hyappodachi* (=one hundred paces stand) is one of the most virulent of Formosa's poisonous snakes, and a person bitten by one of them is not supposed to be able to walk more than one hundred paces before falling down dead.

We were now approaching what was perhaps the second object of our visit to Formosa—the famous East Coast cliffs. There are many descriptions of these cliffs in print, but I have seen very few which are accurate. It may be well therefore to describe them in some detail. For about 35 miles, as the crow flies, along the northern half of the east coast of Formosa, the mountains rise straight out of the sea. In places the lower slopes are quite sheer for the first 500 or 600 feet (in one place for 750 feet), after which they gradually recede, until at the highest point of about 8000 feet the gradient is only 1 in 2. Even this is inspiring enough, especially where here and there grim precipices force their way through the dense vegetation which is a feature of all this coast.

I shall never forget my first sight of these cliffs. We had been following the road up a long winding valley, and then suddenly it seemed to come to an end. We reached the top, and there hundreds of feet below us lay the ocean with its narrow belt of shore broken here and there by the beetling cliffs. Above, the mountains seemed to climb endlessly until its topmost heights were lost in cloud, while the road itself swung away to the right hacked out of the very face of the cliff itself.

These cliffs long proved a problem to travellers who would reach the fertile plain to the south-east of the island. The lack of harbours and the steepness of the coast made the approach from the sea an uncertain quantity, while the presence of the head-hunters in the interior constituted an even greater danger. A Chinese governor with military aid made a rickshaw path, but storm and savage alike soon rendered it impassable, and what we saw of its remains would have made us chary of venturing along it even on foot. The Japanese, when they took over the administration of the island, cut a narrow path for police use, and flung temporary bridges across the rivers which break the cliffs, but the cost of upkeep was so heavy that finally it was decided to make a permanent motor road. The original plans were for a road 12 feet in breadth, but in commemoration of the coronation this was increased to 18 feet. After an expenditure of half a million pounds and at the cost of fifty-eight lives, the road was finally opened to traffic in April 1931. But the difficulties have been so immense and in bad weather the danger from falling rock is so great that it will be many years ere the road takes its final form. We saw one such fall which had obliterated the road for a distance of 50 yards. The rivers are now spanned by magnificent suspension bridges of similar width. The longest of these, over the Daidakusui Valley, is in two spans and is

1700 feet in length. The whole undertaking constitutes the greatest feat of engineering that I have seen in the Far East. To-day the East Coast cliffs are accessible to the traveller, who may motor the entire length in about three hours.

That evening we reached the little colony of Kenkai. The authorities had notified the local police of our coming, and when later that evening I called on the superintendent I found that plans had already been made for our start for Chuosenzan next day. We little thought as we rested under the hospitable roof of the hotel that within three months the whole place would be wiped out by a typhoon. The village had been the scene of another tragedy some years before when a police detachment had been annihilated by a head-hunter raid. The tribe through whose territory we were now about to pass were known as the Taruko. Twenty-five years before they had been one of the most warlike as well as one of the most troublesome of the savage peoples. To-day, thanks to Japanese rule, they are one of the most progressive and enlightened tribes in the whole savage area.

A couple of miles in a motor car brought us to the police post at the entrance to the Takkiri gorge, where we saw some old savage swords, grim relics of the earlier days. Our carriers were awaiting us, and it did not take long to start. The East Coast Road crosses the mouth of the Takkiri by a big suspension bridge over 400 feet long. We had not proceeded very far up the gorge before we realized that we were approaching something quite out of the ordinary. Rising up tier after tier on either side to a height of over 4000 feet stood the mountain gates. In places the dense forest which clung to their slopes was broken by precipices of awful mien, while here and there rounded rocks lifted our thoughts back to those primeval days when the Takkiri was a gentle stream meandering across the plateau above.

Soon we saw ahead of us what seemed to be a long rope, stretched across the valley at a height of about 200 feet. Our police escort informed us that we were to cross it. As we got nearer we realized that the feat was not so Blondin-like as we had anticipated, and when finally we stood on the quivering span of a strong suspension bridge nearly 300 feet long we gained a fresh idea of the pains which the Japanese are taking to open up these mountain recesses to the outer world.

The gorge increased in grandeur the deeper we entered. I thought of Wordsworth's description of the Simplon Pass:

> The immeasurable heights
> Of woods decaying, never to be decayed,
> The stationary blasts of waterfalls,
> And in the narrow rent at every turn
> Winds thwarting winds, bewildered and forlorn.
> The torrents shooting from the clear sky,
> The rocks that muttered close upon our ears,
> Black drizzling crags that spake by the wayside
> And giddy prospect of the raving stream.

We were now approaching that part of the gorge known as The Precipices. After leaving the police post of Batakan with its school for savages and exchange mart, the path zigzags up the mountain side until it reaches the

narrowest part of the valley. The sides are almost sheer. Two thousand feet below the river cuts its way through a rampart of rock in a manner almost incredible. Overhead for 1500 feet more the cliff rises vertically till its crest is lost in the mists of the mountain above. Across the gorge, apparently but a few feet away (we could throw stones across the river), the giddy heights tower above us, while stone and tree struggle to obtain a foothold on its precipitous slopes. At one point there stands the grave of a policeman, the victim of a people as savage as their environment.

We would have liked to linger on the precipice path, but still had some distance to go to the police post of Tabito, 16 miles from the entrance to the gorge. A long steady drop brought us to the police station at its northern end, known as "The meeting of the waters"; but how different from its Irish namesake!

The post of Tabito is quite the biggest we saw during our wanderings. In addition to the divisional administration offices there are quarters for sixteen police and their families, an elementary school and dormitory for the Japanese children in the district, a school for young savages, a shop and even a club. Here as ever we met with the utmost courtesy and attention.

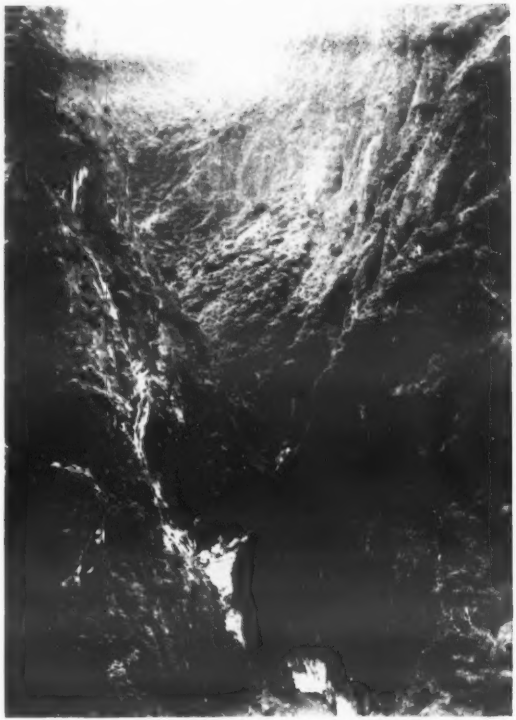
An easy march of 10 miles next day took us to Tausai, the post at the base of Chuosenzan. We were the first foreigners to have penetrated so far. We got a momentary glimpse of the mountain through the clouds, but it was very different from the rocky point we had seen from Tsugitaka ten days before. We reached the post at midday under a burning sun. We found the whole village had turned out to receive us. The school children were ranged in rows on either side of the path, and at a given word from their teacher they made a profound bow. What they must have thought of the unkempt, unshaven, tattered creatures before them is perhaps best left unsaid. After this formal greeting the savages settled down to study us more closely, for they had never seen a white man before. Even when we took refuge in the quarters placed at our disposal, a gentle sliding of the window curtain and a dark shadow in the gap showed that they intended to make the most of their opportunities.

The savages had been planning for some time to go on a hunting expedition, and on hearing of our coming they decided to go with us. When therefore we started next morning we were a party of forty all told—three climbers, three police as bodyguard, four police servants, and about thirty savages, and, last but not least, numberless dogs.

A further word must be said about these creatures. They would make a clean sweep of all the prizes at any mongrel show the world over, yet they are good hunters and their owners think a lot of them. A good dog will fetch as much as ¥8.00, which represents a savage's living expenses for three months. The dogs love a hunt, so, as may be imagined, the din was terrific. The police had lent out about a dozen guns and in addition each man had his bow and arrows. The bows are made from mulberry or peach wood, and the string is generally kept loose, but by an ingenious system of loops and notches it is possible to make it taut in an instant. The arrows are of bamboo tipped with iron. A savage only carries two or three arrows, as he counts on recovering them after shooting.

Phot. K. A. C. G.

Looking down into the Takkiri Gorge from a point 2000 feet above the river



Phot. K. A. C. G.

Goryu: "The Meeting of the Waters"

By courtesy of the Formosan Government

The East Coast Road near Girumarudo, about 600 feet above the sea

600 feet above the sea

We started early as we were under the impression that we had a long day ahead. The weather was good, too good to last. For the first mile or so our way lay through a series of savage villages arranged in terraces up the mountain side. After two hours and a half of hot going we reached a welcome spot in the forest for lunch, where we halted. But not for long, as the rain began to fall and we were not sorry, if surprised, to hear that our goal for the night was only a short way ahead—a savage hunting-box at a height of about 7500 feet. This box was of similar design to an ordinary hut, though on a somewhat smaller scale. When we stood up we had to be careful not to strike our heads on the rafters; when we lay down there was a margin of only 2 feet between the fire and the wall on which to lay our bark beds.

At dawn we were awakened by a deafening din. The day of the chase had arrived and the hounds were straining at the leash. Every savage had his own peculiar cry, every dog his answering howl. Together they made bedlam. Fortunately the party did not take long to get away, but we heard their calls and howls in the forest off and on all through the day, and at one point had the excitement of seeing two deer break cover with the hounds in hot pursuit.

For the next 1000 feet our way continued through the forest. We finally emerged on to a belt of fine pasture land from which we could get an occasional glimpse of the upper slopes of the mountain far above us. Mists were already hovering about in ominous fashion and there was no time for delay. After another encounter with the forest we reached the base of the final arête of 2500 feet. The way up is punctuated by patches of rock, some of a nature to delight a climber's heart, others so flaked and rotten as to remind one of a charred book. Despite the presence of the ubiquitous creeping pine, the way up was not difficult, and just five hours after leaving camp we were on the summit. But there was no view: the forbidden ridge to the north leading to Nankotaizan was after a few feet lost in thick mist. We waited in vain for it to clear for over an hour, enjoying the rhododendron blooms hard by and the sight of a drop away of terrifying depth when the clouds momentarily cleared. Finally we started down, and had not dropped more than a few hundred feet when it came on to pour. Three hours later half a dozen bedraggled creatures, soaked to the skin, made their way into the hut which they had left with such high hopes in the morning. The savages returned a few minutes after, triumphant and quite unaffected by the rain, for they had no clothes to get wet. The bag consisted of one deer and two mountain goats. That night the feast was further embellished by a bottle of Buchanan's "Black and White," which the sergeant produced.

Two of the younger members of the hunting party joined us later round the fire. The younger, Ubusunokan, was only fifteen. He had "graduated" from the village school the year before and was in high spirits as he had been in at the kill, and had evidently been "blooded" too, if such a custom prevails among the savages of the East. He was keen to tell me all he knew, and started on sums. Finally our conversation drifted on to our homes, and with a wondering expression he asked me, "How many people live in your savage village?" As darkness fell our police friends got talking on more serious things, such as savage life and its problems, and the need of religious educa-

tion. Like many other Japanese to-day they were feeling the need of something more than the ethical teaching given in the schools.

We got back to Tausai by noon next day, for the weather had cleared and the track was easy, but shortly after lunch the rain came on again, and as we were anxious to reach Tabito by nightfall we had no option but to brave the elements once again with a sneaking envy of the savage. The walk was uneventful save at one point where the road was broken and the mountain side slowly sliding down, but a dash across soon landed us in safety.

Next day we retraced our steps through the Takkiri Gorge. We could not hurry; it would have been sacrilege to do so. I took the opportunity of asking our escort something about the customs of the Taruko clan. Apparently marriage is not the matter of individual choice that it is among the savages to the north. Arrangements are made by the families of the parties concerned, in some cases secretly during their childhood, as indeed used to be the custom in feudal England. The men however have some say before things are finally fixed up. After marriage the new couple live in the family home.

From the entrance to the Takkiri Gorge a motor carried us over the last 18 miles to Karenko, the capital of the eastern prefecture. It has a population of 10,000 and is a well-spaced and attractive town, very tropical in appearance with its broad avenues and verandaed houses. It is the headquarters of a Government *saké* monopoly, and also the terminus of a railway to the south and a steamship line to the north. Unfortunately the coast falls away so rapidly that it is not possible to make a harbour, and in consequence all communication between the shore and the steamer is by means of surf boats. These are loaded on the beach with passengers and merchandise and then amidst a tumult of shouting and splashing are shoved into the waves by a mob of Formosans.

As we made our way north in the Beppu Maru we got a view of the East Coast cliffs. They were not so steep as the nearer view would suggest, but their height is truly wonderful. We could see their crest far up in the clouds. Just above the shore-line was a faint streak: it was the Road. Truly the girdling of those cliffs is a feat of which any nation might be proud.

At Suwo, the port of disembarkation, the process is similar to that at Karenko, though in smoother water as there is some shelter. As we were anxious to see the northern end of the road we took a car down the first 16 miles to its highest point, some 1200 feet above the sea. On the way the chauffeur told us that we should be passing through a village where there were two white savages. We had heard of such villages in the south, whose inhabitants are the descendants of Spaniards wrecked on the coast some centuries ago. In this instance however the story is perhaps less romantic. About seventy years ago a small British company was formed to develop the natural resources in savage territory. It consisted of an Englishman, a German, an American, a Spanish Mexican, a Portuguese, and two Scots. The venture proved abortive on account of the opposition of the Chinese authorities, and finally the whole party were drowned at sea. One of them however had married a savage woman and these were his descendants. We saw one of them. Despite his savage get-up there was no mistaking his ancestry.

That night as the clock struck twelve we steamed into the Central Station at Taihoku and our scrambles in the mountains in the north-east of Formosa were over. It is hard to estimate what feature was the most interesting: the thrill of covering new territory and climbing new mountains, the contact with the savages in their still relatively primitive state, or the opportunity of seeing at close quarters the magnificent efforts of their Japanese rulers on their behalf. It is enough to say that the north-east of Formosa, indeed the whole mountain area, affords a field of absorbing interest to climber, explorer, and ethnologist alike.

DISCUSSION

Before the paper the PRESIDENT (Admiral Sir WILLIAM GOODENOUGH) said: We are to hear to-night of one of those regions which I mentioned earlier in the session, an island, easily accessible, very beautiful, and very interesting, as both its occidental and oriental names indicate, but of which very little is known. If time permits I will, later in the evening, speak of the history of the island and how it is that the interior of it, at any rate, is so little known. It adds to the interest if we know the circumstances that have produced if not the physical at least the other geographical objects.

Mr. Murray Walton, who speaks to us to-night on the Mountains and Head-hunters of Formosa, was at Pembroke College, Cambridge, where he was an Exhibitioner. He has served for fourteen years under the British Missionary Society and in close connection with the Japanese, and it is interesting to note that since the year 1923 he has been working under a Japanese bishop. Mr. Murray Walton has climbed and travelled extensively throughout the Japanese empire and he speaks Japanese fluently. He spent six weeks in Formosa in 1930, and his description of that visit is the subject of the lecture to-night. When on the island he worked in close contact with the Japanese and a large part of his time was spent in regions which hitherto have not been visited by foreigners. Naturally there his knowledge of Japanese was of great assistance to him in obtaining information, some of which information he will impart to us in a lecture which I now invite him to deliver.

Mr. Murray Walton then read the paper printed above, and a discussion followed.

The PRESIDENT: Mr. de Bunsen, who is with us to-night, was for some time British Consul in Tamsui. I will ask him to add a word or two.

Mr. E. H. de BUNSEN: It is a great pleasure to me to stand here to-night and to back up what Mr. Murray Walton has said with regard to the high standard maintained by the Japanese authorities in Formosa. It is work of which any nation might be proud. We are very apt to dwell on the chaotic state in which Formosa remained for several centuries under Chinese rule, but it should be remembered that the Chinese authorities in Peking never took Formosa very seriously; probably, in their own minds, they thought that after a few more centuries had passed everything there would work out quite well.

I think that the Japanese in Formosa have had several enormous advantages. One of them is that they have, in the Savage Territory of Formosa, been entirely free from any sort of fear of extraneous interference and, because they have been confident, they have been able to act in the very liberal and generous way in which they have acted there. Another thing which has helped them in the past, and is probably helping them very much to-day, is that the Savage Territory of Formosa is free from the financial troubles which beset the rest of the world. As Mr. Walton has indicated, money, as such, is gradually coming into use in Formosa, but, taken as a whole, the Savage Territory has enjoyed until quite

recently what one might call a non-monetary civilization, and has therefore been spared a very great deal of trouble. I might add that Japanese officials of experience, in whose company I travelled in Formosa, made to me very much the same observations as they made to Mr. Walton. They felt that their material work was going on excellently, but they were much concerned as to what line they should take in regard to religious teaching.

I was particularly interested when Mr. Walton used the words "nomadic existence" when speaking of the Taiyals. From the little I saw of them they appeared to be a people who put up light, flimsy huts, live in them for a time, and then move on, and thus different from the Tsalisen Paiwans of the south, who live to a great extent in slate houses.

Mr. Walton spoke of the outbreak of 1930 and its connection with divorces between Savages and Chinese. Another cause which I heard suggested for that outbreak was the different rate of wages paid by the authorities to Chinese and Savage labour. Probably there was a combination of causes, but it was a frontier post—frontiers are always difficult places—and there you get an example of the difficulties that arise when two entirely different civilizations come into contact.

Another point which should be noted is how remarkably versatile the Japanese police officers in Formosa have shown themselves. In Japan itself the carpenter remains a carpenter, the shipwright a shipwright, the harness-maker a harness-maker, the postman a postman, and so on; but once they are in the Savage Territory—because, I suppose, there are no trade-guilds to consider, and trade-guilds are very strong in Japan—these men feel that they can turn their hands to what they like; and they do it extremely well.

The pictures Mr. Walton showed of the east coast gave me very great pleasure indeed, and for this reason: some six years ago, on the occasion of a lecture on Formosa, our late President, Dr. Hogarth, in concluding the proceedings, expressed the hope that the day would come when somebody would bring back to the Society a series of photographs of the eastern cliffs. We have seen very beautiful pictures of them to-night, and, in view of what Dr. Hogarth said, it was a particular pleasure to see them.

I have one other note on Mr. Walton's paper, namely, that he was not very favourably impressed with the standard of cleanliness among the Taiyals of the north. I agree that they are people of rather dirty habits, but I think he would have found that the Paiwans in the south, with their slate houses, have a considerably higher standard.

The PRESIDENT: What a pleasure it is to hear Dr. Hogarth's name mentioned. We are very grateful to you, Mr. de Bunsen, for mentioning it. And how he would have enjoyed seeing something that he hoped for fulfilled by the pictures shown to-night.

We have heard a very interesting description from Mr. Murray Walton of the island of Formosa and of its inhabitants. It may be of interest to consider what was happening along the coast-line while the head-hunters were pursuing their business, we presume undisturbed, farther inland. The bibliography of the island is not very extensive. For those who wish to pursue the subject there is an interesting book, 'Formosa under the Dutch,' by the Rev. William Campbell, of the English Presbyterian Mission, at the end of which you will find a bibliography; and if you want a very full description of the island you will find it in Mr. James W. Davidson's 'Formosa Past and Present.'

Well, after the conflict of those two dragons and the upset which Mr. Walton referred to, there came a very long gap in the recorded history, and I will only refer to the coast-line. One may say that the history really began in the seventh

century, when the Chinese made an expedition to the island and found, among others, a considerable number of Malays; the Malays themselves would appear to have been comparative newcomers there. May I say at once that it would appear to be incorrect to speak of the island as Formosa before the Portuguese went there in the sixteenth century. Prior to that the native name for the island, and it may be still for all I know, was Pak-han. The Chinese called it Tiw-wan, the translation of which, so far as I can give it, is "terraced beach" or something of the kind. The Chinese made little impression on the Malays when they first went there. They thought the island was unworthy of their notice, and retired. There was no further knowledge of the island for a considerable number of centuries.

By the twelfth century the inhabitants of the island itself were sufficiently adventurous to make an expedition to the mainland, landing in Fokien. They were also sufficiently skilled to use iron-tipped weapons when they landed in Fokien, and they coveted very much the armour which the Chinese were in the habit of wearing. The Chinese re-start their history in the island from about the fifteenth century, when ships were driven ashore from Siam on their way north, and sailors brought back stories of the beauty of Formosa and its possibilities so far as commerce was concerned. The Japanese appear to have taken part in the island's history in about the fourteenth century, and it is of interest to note, in those peaceful times of the fourteenth and fifteenth centuries, that, once the traders of China and Japan did get ashore in this wonderful place, they got on very well together.

The Portuguese arrived in the latter part of the sixteenth century and gave the island the name "Ilha Formosa"—the Beautiful Island. The Dutch soon followed. There is an interesting picture drawn by a man called Valentyn, the historian of the Dutch, whose book is translated into English. He speaks very frankly about the activities of the Dutch and is not always complimentary to his own people. The Dutch established themselves in Formosa, made friends of the natives, obtained the general governorship over the island, and were strong enough to gain ascendancy over the Spaniards who came up from Manila. In the middle of the seventeenth century there came a very interesting movement, for the Manchus, as we know, drove the Ming dynasty out. This made a great change in Formosa, for one of the Mings whose name was Koxinga, a man of great activity, took a very large army, invaded the island, and took it from the Dutch.

Time does not permit of going into details. There was a Hungarian who visited Formosa in the seventeenth century, and he gives a very good description, written in French and translated into English. Then La Pérouse, one whose name is very well known to this Society, went to the island. Being close to the mainland, naturally there were a good many wrecks of vessels going up and down and ships going to rescue their nationals and find out where they were landed; and there were various other troubles.

We come to the names given to various parts of the island: Mount Morrison and what is known as the Dodd Range and Mount Sylvia. I am not quite certain whether the nautical profession can claim the name Mount Morrison, for there were two Morrisons—one Alexander and one called William. They were both agents of Jardine Matheson about the middle of the nineteenth century, and I think the name in all probability came from them. There was also a ship called *Morrison*. The Dodd Range was named after a merchant who lived in Formosa and behaved with great gallantry on more than one occasion in rescuing those who had been shipwrecked off the coast. I do not suppose that the officers of the *Sylvia* ever climbed the mountain.

I mention all this for one reason: that it is quite easy to imagine that there was not much time left, with all those troubles going on on the coast, to proceed farther inland. Now that there is a settled government in Formosa, a well-ordered progressive government, we may hope to get to know more of the island. There certainly is a large field for the ethnographer, and you, Mr. Murray Walton, have, I am quite sure, not only added to our knowledge but increased our desire to know more about the island. When we have people who come forward, especially young men, who want to go out there and learn more about the island, map it, survey it, find out about the people, they will be encouraged by this Society, and they also, I feel quite sure, Mr. Walton, will be encouraged by your experience, especially if they read or have listened to your lecture which has filled us with interest and for which we ask you to accept the thanks of the Society and of this audience.

THE URBANIZATION OF THE SHETLAND ISLANDS: *A paper read at the Afternoon Meeting of the Society on 13 February 1933, by*

A. C. O'DELL

THREE remarkable shifts of population in the Shetland Isles have occurred during historic times. On the first two occasions the Shetlanders changed their homes and industries under external pressure; on the third the compulsion came from within—part and parcel of the almost world-wide centripetal movement that characterizes the present day.

The Shetland Islands, as the most northerly part of the British Isles, occupy an isolated position if regarded from the south; yet with respect to their position in the Norwegian Sea they have functioned as a stepping-stone in the movement of the Nordic peoples westwards.

The relief of the islands is low and undulating, the highest point, Ronas Hill, being only 1475 feet, yet few level tracts exist suitable for the practice of agriculture on a large scale. The relief results from the solid geology as modified by intensive glacial erosion under which the sandstone and the metamorphosed limestone bands became the areas of lower relief relative to the more resistant granites, gabbros, and schists. If contrasted with the corresponding lower areas of Orkney, those of Shetland are seen to lack that superficial deposit of shelly boulder clay which has always been the foundation of the rich agricultural development of the more southerly archipelago. Hence one finds in Shetland a much closer correlation between agriculture and solid geology, shown by the concentration of the main crofting settlements on the warm Old Red Sandstone soils and the limestone bands.

The mid-winter days are very short, five to six hours, and the summer days are correspondingly long, for the archipelago lies as far north as Cape Desolation in south-west Greenland. The midsummer night is sufficiently light to take photographs owing to the bright twilight period of five hours between sunset and sunrise. The rainfall of 38 inches is low, considering the insular position, being only half that of Fort William in the west of Scotland. The reason is of course the low relief. The rainfall, in conjunction with the maritime temperatures, limits the crofters to the cultivation of such crops as barley, oats, cabbage, and potatoes. The Shetland Islands suffer from a high percentage of cloudiness (about 74 per cent. average for the whole year, compared with Lowestoft 61 per cent.), and many wet days in the ripening period. A wet, windy September may ruin the crop by flattening the stalk and "shaking" the head.

The Old Red Sandstone, practically universal in Orkney, occurs here only in two main areas: the district of Walls, with which is associated Foula, and the South-East Mainland with which can be included isolated Fair Isle. The areas of granite and gabbro are typically sterile for agriculture but are coming into their own as tourist areas on account of the magnificent cliff scenery they so often display. The serpentines that are found in Fetlar, Unst, and in Scousburgh (in the south) have as associated minerals chromite and soapstone, which are the only minerals that have been worked as a commercial proposition apart from the Sandwick copper mine in the Old Red. None of these workings

Fig. 1. Geology of the Shetlands

has afforded any lasting counter-attraction to the depopulation trends that have affected the islands. The remainder of the country consists of metamorphosed rocks which are more often than not covered with peat, universally used by the crofters for fuel, after cutting and curing. The most important of the metamorphosed occurrences are undoubtedly the limestone bands: first because they have provided soils amenable to treatment, and secondly since burning of the limestone has provided a means of sweetening the other and more acid soils. Once a soil has been well limed it keeps condition for more than thirty years, as witness croft sites near Quendale (where the crofters were evicted a generation ago), upon which only now is the group of plants appearing that indicates impoverishment of lime content. This lime content being so fundamental, it is not astonishing that all settlement maps show a marked concentration of population on the limestone areas. The climate being so uniform over the 71-mile stretch north to south of the islands, soils are the limiting factor of the settlement, but they do not entirely explain either the present or past intensities in various parts of the islands.

The first settlers of whom we have any exact knowledge are the peasant immigrants of the eighth and ninth centuries A.D. who came from the Möre and Agder districts of south-west Norway, driven presumably by hunger. These settlers were the predecessors in time of the Vikings of saga fame; and their descendants, who form a large part of the basic stock of the islands, speak in a modified form the dialect of south-west Norway as it existed twelve hundred years ago. The islands, *circa* 872, came under the jurisdiction of the kings of Norway and were attached to the Archbishopric of Nidaros (Trondheim), but little is heard of the group until 1468–1469, when Orkney and Shetland were separately impignorated as pledges for the payment of the dowry of Margaret of Denmark to James the Third of Scotland.

Till that period the islanders, like the Icelanders, had met at local "things," the location of some of which are preserved in the present parish names, *e.g.* Delting and Nesting. Representatives from the whole archipelago had a common council, for administration and justice, at the "althing" which was held on a loch island in Tingwall Valley. To accommodate this influx huts were erected on the southern seaward end of Tingwall at Scalloway ("Voe of temporary booths"), and with the building of a castle at the end of the sixteenth century Scalloway became the county town, and remained so until the development of Lerwick led to its relative, though not absolute, decline in population and importance.

The essential changes in the economy of the islands from 1468 until 1700 may be summed up under two heads: the large replacement by arbitrary methods of the *udal* or peasant-proprietor system of land ownership by a modified form of the Scottish system of *feu;* and side by side with this the seventeenth-century development by the Dutch of a large-scale herring fishery. At the time of the initial Scottish settlement there was a growing trade in dried fish which was organized by merchants from Bremen and the Low Countries and, to a lesser extent, by the English and Scots traders. The centres of this dried fish trade were scattered over the islands in areas convenient for fishing which at the same time afforded safe anchorage for the trading vessels. The actual ling and cod fishing was carried on by the Shetland

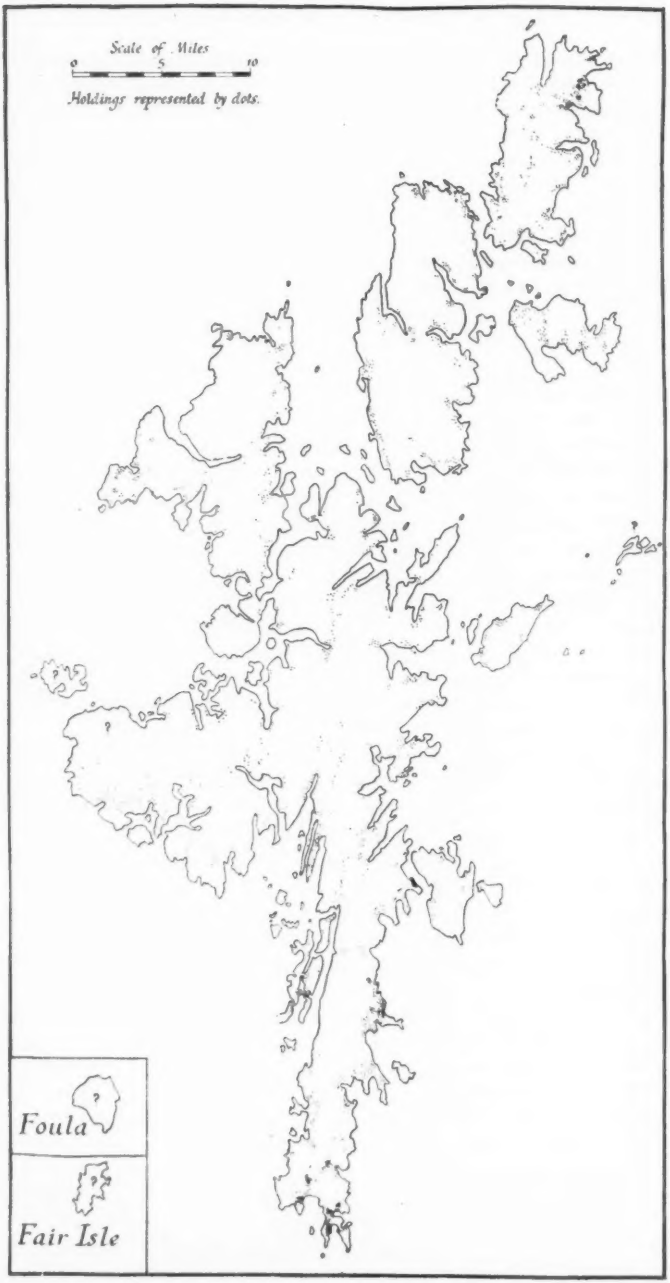


Fig. 2. Settlement in the Shetlands, 1716

peasants, while these "green fish" were bought by the merchants and dried on stony ayres. An aerial view of Whalsay shows a stone booth and landing-stage and also the shingle beach which adjoins it. By 1700 the islands were progressing quietly, though there had been severe famines (as in 1636), and various smallpox plagues introduced by foreign fishermen, which kept the population at a level which was estimated as being less than 20,000.[1]

The year 1712 introduces the first great plane of cleavage in the economic life of the people. A tariff was imposed on foreign salt, and a bounty or bonus given on all fish cured by British salt and British merchants. These measures stimulated the Scottish landlords to take the trade out of the hands of the Dutch and Hanse curers, who until then had controlled the supply of dried fish to the Catholic countries. Various parliamentary measures during the eighteenth century, promising similar bounties, stimulated the formation of British fishery companies to wrest away from the Dutch their monopoly of herrings cured in barrels. The Dutch were using Bressay Sound as a rendezvous for their herring fishing boats (which at this period numbered 2000 to 3000), at the beginning of the fishing in June. Fortunately there is extant a Rental of the Islands made before the landlords had sufficient time to force a shift of population from the best agricultural land to the seaboard. This Rental[2] is the basis of Fig. 2 and shows the state of settlement in 1716 with the exception of a few lacunae. Lerwick at this period had two to three hundred families,[3] and this represents a rapid increase in the last two generations, for in 1625 the booths and houses on the site of the town had been totally destroyed by the order of the Scalloway Court, which "being informed of the great abomination and wickedness committit yerlie be the Hollandaris and cuntrie people, godless and prophane persones repairing to thame at the houssis of Lerwick quhilk is a desert place. . . . Ordanis the said houssis to be utterlie dimolished and downe cassin to the ground be the haill awneris thairof. Apud Skalloway bankis in castro ibidem Septimo Nov. 1625." Nevertheless the value of the site was too great to be deserted, and Lerwick grew steadily, despite its burning by the Dutch and repeated failures of the fishings. The main function of the town was to sell the Dutch herring fishers such goods as knitted stockings and sugar loaves, and at the same time provide recreation for the fishermen waiting the commencement of the fisheries (J. Brand, *ibid.*). In 1744 the whole town was still south of the Fort which was built by Cromwell to protect the islands from Dutch invasion, while in 1767 it extended up to the Fort which by 1822 was completely engulfed; and the first quays were built by this last date.

[1] MSS. Letter Book of Sumburgh Estate, 1777–1783, Sumburgh Charter Chest, Dunrossness.

[2] Lent by Mackenzie and Kermack, W. S., Edinburgh.

[3] J. Brand, 'A Brief Description of Orkney, Zetland, Pightland-Firth and Caithness,' 1701. An estimate of 1738 (J. T. Irvine, 'Shetland Historical Collection,' vol. ii, Museum of Antiquities Library, Edinburgh) gives the number of families as only 168. "So that in all Lerwick, the most considerable Town in the Country, there are but very few whose Grand-fathers have lived in those Isles. And in Lerwick itself about 30 years agoe there were only 4 Houses, and some years before there were none at all, tho now there are between two & three hundred Families in it." (J. Brand, p. 70, 1st edn.)

The landlords from 1712 onwards set up as fish-curers, and in order to increase the amount of green fish made it a condition of tenure to the tenants that they should supply cod and ling. Simultaneously they subdivided the crofts until they were too small for subsistence-farming and meal had to be bought to eke out the harvest in all but exceptionally good years. Early marriages were encouraged by the landlords so as to increase the number of fishermen on an estate, while at the same time the absence of men on a whaling voyage, a source of money to the crofters, was discouraged by a fine and in extreme cases by eviction from the holding. Previously the line-fishing had been mainly for subsistence, but under this new regime it was part of the rent, so that tenants not only starved but fell into debt to the landlords if the fisheries

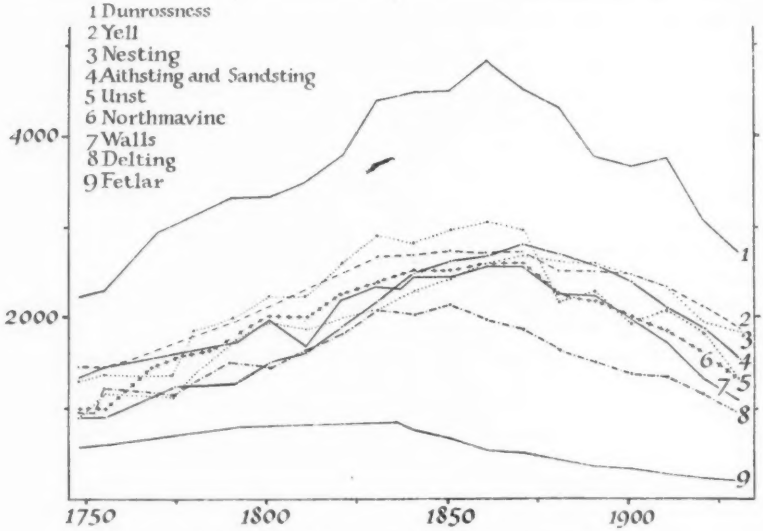


Fig. 3. Population of the "landward" parishes, 1745–1931

failed; and in fact it varied enormously from year to year. A series of bad crops and fishings about the year 1781 reduced the peasants so far below the poverty line that Nova Scotian emigration agents moving through the country were able to persuade numbers to emigrate.[1] This, in addition to an emigration of 280 persons from Caithness and Zetland in 1774, owing to the bad state of trade, was a serious drain on the population. The landlords resisted this tendency to emigrate by granting free meal and long credits. The graphs[2] of the parish populations from 1745 onwards show the rapid increase due to this policy, but a further factor was the immunity obtained from smallpox devastations, after about 1750, by inoculation. In the Napoleonic Wars the

[1] MSS. Sumburgh Letter Book, 1777–1783.

[2] Constructed from official census returns after 1800 and from various semi-official ecclesiastical returns before that date.

Crown Copyright reserved. *By permission of the Controller, H.M. Stationery Office, and Director General, Ordnance Survey*

Shetland Islands: looking north over Lerwick and Bressay Sound

Crown Copyright reserved. *By permission of the Controller, H.M. Stationery Office, and Director General, Ordnance Survey*

Looking south over Walls towards Vaila Island, Zetland

Shetlanders were in demand as seamen, and the terror of the press-gang hung heavily over the area: more than three thousand Shetland men were in the navy in 1811, and more in the mercantile marine; hence the flattening of the population curves.

By the middle of the nineteenth century the islands were entering more intimately into the Scottish plexus. Steam communication had been started in the thirties and linked Shetland closely with Aberdeen and Leith, replacing the erratic packet-boat linkage with Peterhead.

The forties of the century saw the second of the great planes of cleavage in the settlement distribution. The landlords from 1840 and onwards began evicting the crofters in order to create sheep walks, which brought a greater return than the line fishers. The price of wool was now sufficiently high, owing to the demand from the mills, to influence the landlords in a similar fashion to the fish bounty of the early eighteenth century, but this time the result was depopulation instead of an increase. The second dot map shows the distribution of inhabited houses in April 1841, when the settlement of the "landward" (*i.e.* rural or non-urban) parishes was about at its maximum.[1] The rapid declines after this date, up to the 1881 Census, must be mainly attributed to the landlords' depopulating action; but after that date, owing to immunity from eviction afforded by the Crofters' Act of 1886, to changing economic and social factors.

In 1850, as a relief for famine-stricken families, the first roads (with the exception of a mile-long road from Lerwick to the peat area, which originally continued to Tingwall Valley, that dates from 1800) were constructed under military supervision, and owing to the method of labour payment were known as "meal-roads." These roads, much extended and improved in recent years, have effectively replaced boat transport for all save inter-insular routes.

The first Buckie fishermen came to Shetland in 1876 and introduced the decked type of boat for line fishing, and these boats became general after the disastrous loss of life in the gale of 1881. Later the half-decked line-boats were displaced by the steam trawler working from Aberdeen. Thus perished the oldest of Shetland's staple "cash" industries, the catching of such fish as cod and ling. The Crofters Commission of the eighties gave fixity of tenure and the succeeding Land Courts have lowered rents in an attempt to reduce the rapidity of the depopulation.

The eighties thus contain the plane of cleavage between one regime and another. The tide had turned and the over-population of the islands that had long existed was causing emigration on account of social and economic factors. The removal of land from the people for the establishment of sheep walks had still further increased the pressure on the means of existence. The demand for improved social conditions was also a powerful factor: for example, the average number of persons per windowed room was rapidly

[1] The 1841 and 1931 dot maps were prepared from a MSS. list of house names supplied (by the courtesy of A. Froude, Esq., Registrar-General of Scotland) from the 1841 and 1931 MSS. Enumeration Books of the Official Census. The houses were located on the 1st and 2nd editions respectively of the 6-inch O.S. maps of Zetland and plotted on to a ½-inch outline map.

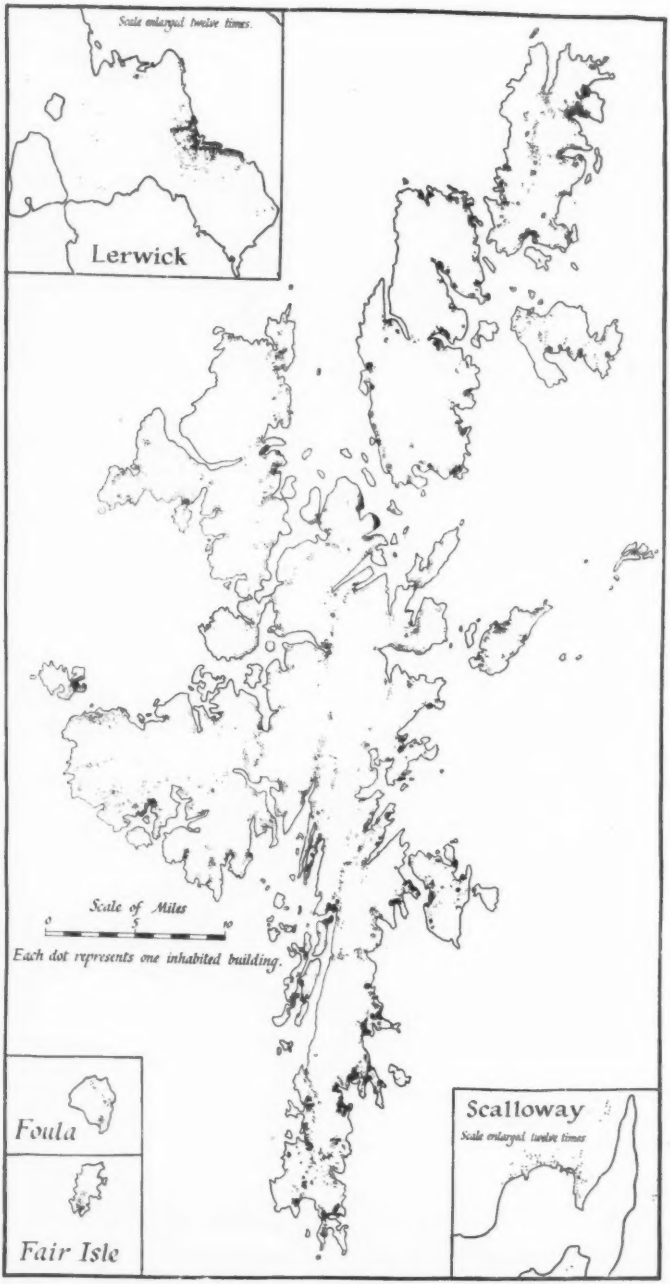


Fig. 4 Population of the Shetlands, 1841

declining largely owing to a decrease in windowless houses, as the table shows:

1861	.. .. ..	3·2 *persons per windowed room*
1871	.. .. ..	2·8
1881	.. .. ..	2·4
1891	.. .. ..	2·0
1901	.. .. ..	1·8
1911	.. .. ..	1·6
1921	.. .. ..	1·5

The emigrants went partly to Scotland, especially to the Midland Valley, and partly abroad, especially to Canada and New Zealand. There was also a partial movement by which the younger folk went south (either as servants, if they were women, or as sailors, if they were men), and returned home later to establish married life on their savings.

Simultaneously there was an immigration of Scots, which has been almost entirely lost sight of, so quietly has it come about. The subjoined table shows the number of immigrants born in various parts of Scotland, and it must be remembered that their offspring are counted as Shetland-born, and hence the dilution of the Shetland stock has increased at an even greater rate than appears at first sight. The immigrants from Aberdeenshire and Banffshire have largely settled in the north part of Lerwick, forming the Scotch quarter, and they are established both as traders and fishers. The crofters of course are still essentially of pure Shetland blood.

In 1905 the Norwegians commenced whaling from Shetland shores, using fast steamers and the Svend Foyn explosive harpoon. The personnel being mainly drawn from Norway the industry did not greatly benefit Shetland, and whaling, despite its forced suspension during the Great War, came to an end in 1929 owing to the local extermination of the whale. About the time of the commencement of the whaling the west-side herring fishery declined; possibly the herring migrated as a result of whaling activities. The erection of a large fish market at Lerwick, combined with the introduction of the steam drifter, which can go more than 40 miles to a night's fishing, saw the concentration of the industry, and thus Lerwick grew at the expense of the other herring-fishing stations, till in 1932 the only other centres—and these only small stations—were Scalloway, Whalsay, Cullivoe (N. Yell), and Collafirth; of which the last two were recently revived by local enterprise.

Lerwick has grown from the original nucleus northwards and westwards on the mainland. The buildings on the 1877, 1900, and 1928 Ordnance Survey maps (6-inch scale) are shown on Fig. 5. The town has expanded according to the demands of either its trading-administrative aspect or the fishing industry. The first has spread its buildings wherever there was a convenient space, but the second has been controlled by powerful factors: the demands of the modern steam drifter. This draws 8 or 9 feet of water and must, since herrings have to be barrelled within twenty-four hours of capture, be able to reach the gutting and curing station at any state of the tide, which at Lerwick is only about 4½ feet. The submarine contours on the diagram show that where the shore shelves gently there has been no development of the fishing pier and buildings. Also the fish-curing stations demand broad flat

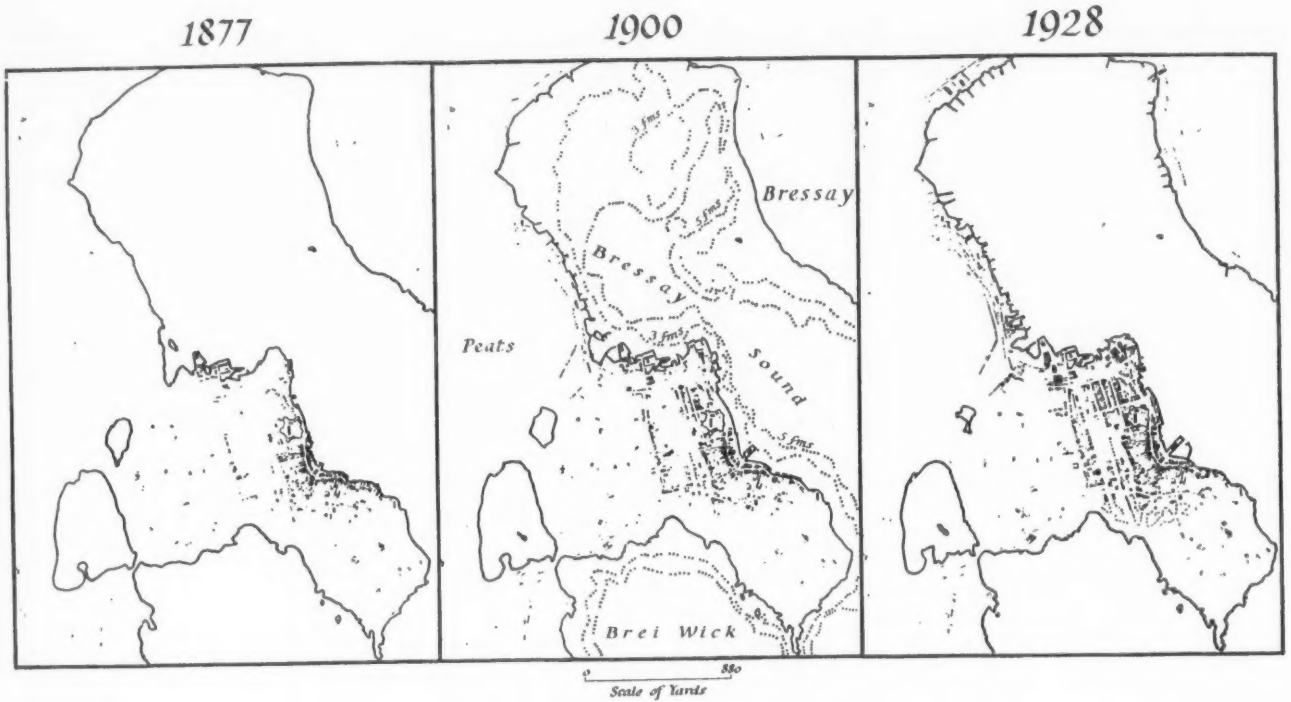


Fig. 5. Growth of Lerwick, 1877–1928

areas for the curing processes and storage of empty and full barrels. As a result where there are cliffs above about a dozen feet the site is neglected by the fishing industry. On account of the full development of the mainland shores of Bressay Sound, the Island of Bressay has also been developed where there are suitable sites: these stations however are unpopular with the workers on account of the relative isolation.

Lerwick has shown a surprising and disproportionate growth in the last fifty years, and it seems as if the attraction of town life with its various amenities such as the filtered tap-water supply (1932), electricity (1932), and gas, and the cinema (two programmes of talking pictures weekly) are likely to operate as greatly in the future as the amenities of the past.

The old subsistence type of crofting is breaking down and the crofter is depending almost entirely on goods bought from stores. But it is only in the town that cash is received in return for labour, excepting in such industries as road-making (the County Road Surveyor is the largest employer of labour in the islands) and ferrying passengers and goods between the main steamer and the shore. There are no landward industries capable of expansion, and the important standbys are failing owing to the present economic crisis of the world, namely, the knitting industry of the women of the croft and the influx of money from outside the islands sent by sons and daughters in employment elsewhere. The continued development of electrification and mechanical haulage in coal mines has robbed the Shetland pony breeder, both large and small, of his greatest market for ponies. The small and declining demand for ponies as children's pets can be most readily satisfied by Shetland pony studs in the south.

The post-war period sees a new type of life in Shetland. The improved communications, road and wireless, have broken the centuries-old isolation of the crofters and at the same time have had the immediate effect of causing a drift towards the area where the demands for easier living are most readily obtained. The lack of certain amenities, owing to isolation, will lead probably to the evacuation of Foula lying in a westerly solitude nearly as severe as that of St. Kilda. Fair Isle, since it has two lighthouse stations that must be maintained, and a branch cable to one of the Shetland–Scotland cables, is not so likely to be deserted. As new factors come into play, so some areas will gain and others will lose their intensity of settlement. As examples from the past, Papa Stour had a dense settlement in 1841 owing to fishing activities and a sparse distribution in 1931; while conversely, Whalsay, owing to the creation of small holdings, has vastly increased its settlement since the war. The Department of Agriculture for Scotland either settled or enlarged the holdings of 315 smallholders from 1 April 1912 to 30 June 1930, of which 99 were new holdings. The total area so settled is 18,310 acres, out of which only 1731 acres are arable.[1] The use of roads is rapidly growing: see for example the following traffic census figures[2] for two road points:

	1922	1925	1928	1931	
Point A	72	112	189	261	Vehicles
B	163	237	319	495	

[1] MSS. Returns supplied by Department of Agriculture for Scotland.
[2] MSS. Returns supplied by Ministry of Transport.

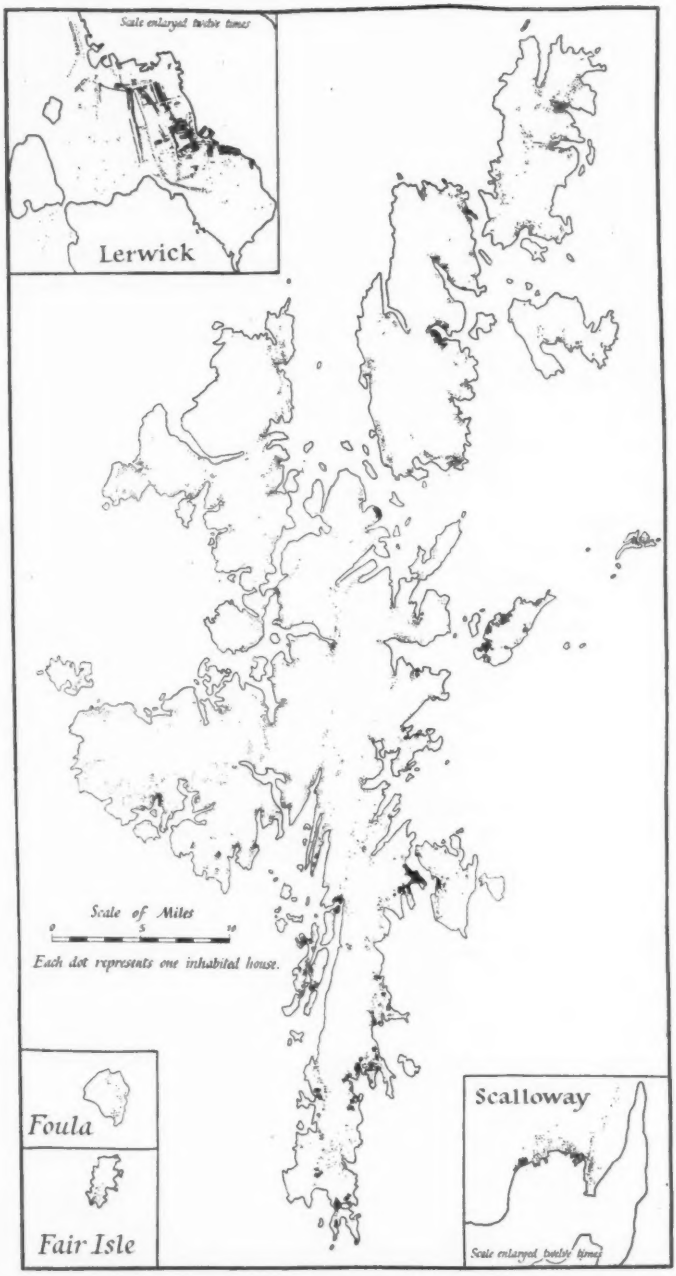


Fig. 6. Population of the Shetlands, 1931

Their value to the development is enormous, replacing, save for insular traffic, the old tedious sea passages by regular omnibus and private hire services.

It seems probable that the population will decline until the islands support a permanent population of under 20,000, when sufficient crops can be grown for fodder and poultry, while each year the herring industry will swell the population to its maximum. The mineral resources are small, as has been proved by the repeated failures of the copper and chromite, and no industry can be built on such a slender foundation. The knitting industry is passing through the transitional period from all hand-spun and knitted to all machine-made. Some women use knitting machines while others still cling to the age-old spinning-wheel.

There exists then a crofting community, with a higher standard of living than the Western Hebrides, which is reducing its numbers by emigration, or by migration to Lerwick, in order to increase or even maintain the standard of living under present conditions. The tendency to over-population that occurs in all British communities is being opposed in the only way feasible since the position at the extreme north of the British Isles and the absence of suitable raw materials militates against the growth of any large-scale industries. The rapid increase of Lerwick in the last forty years has somewhat obscured the depopulation that has occurred over the islands generally. The increase of Lerwick at the same rate is not, without new industries, likely to be continued, whereas the rural population may be expected to decline further.

Population, emigration, and immigration tables are appended. The later date of the 1921 census was partly responsible for the great decrease in the 1921–1931 period. Nevertheless there has been a decline in the population apart from the seasonal movements, and this is reflected in the rise of the percentage of "Shetland-born" persons, since the others are the first to go. The decline in the percentage of immigrants from the fishing counties is noteworthy.

POPULATION OF THE SHETLANDS

	1861	1871	1881	1891	1901	1911	1921	1931
Population	31,670	31,608	29,705	28,711	28,166	27,911	25,520	21,421
a. Shetland-born ..	98·0%	97·6	94·7	94·4	93·2	90·8	88·3	92·9
b. Scottish (excluding Shetlands) ..	1·6	1·9	4·2	4·6	5·0	6·5	8·4	5·6
c. Of non-Scottish birth	0·4	0·5	1·1	1·0	1·8	2·7	3·3	1·5

EMIGRANTS TO SCOTLAND FROM THE SHETLANDS

	1861	1871	1881	1891	1901	1911	1921	1931
Total emigrants to Scotland	1939	3035	3742	4284	5400	4388	4915	4580
a. To Highland counties	14·3%	11·0	9·1	8·2	7·9	9·3	10·0	9·8
b. To fishing counties	15·0	10·2	8·4	9·2	9·7	13·1	17·1	17·3
c. To the Midland Valley	69·0	77·5	81·0	81·3	80·8	76·4	70·9	70·2
d. To the Southern Uplands	1·7	1·3	1·5	1·3	1·6	1·2	2·0	2·7

IMMIGRANTS TO THE SHETLANDS FROM SCOTLAND

	1861	1871	1881	1891	1901	1911	1921	1931
Total immigrants from Scotland ..	513	617	1330	1328	1421	1814	2138	1205
a. Born in Highland counties	26·3%	35·7	25·5	27·4	31·2	21·5	23·2	22·2
b. Born in fishing counties	35·7	25·0	47·2	44·1	40·1	49·2	50·8	37·5
c. Born in Midland Valley	33·3	32·8	24·9	26·6	27·1	27·2	24·2	38·3
d. Born in Southern Uplands	4·7	6·5	2·4	1·9	1·6	2·1	1·8	2·0

DISCUSSION

Before the paper the PRESIDENT (Admiral Sir WILLIAM GOODENOUGH) said: The Shetland Islands have a comparatively small area and few towns. That is not to say that the islands provide few interests. This afternoon Mr. O'Dell, who has been for some time—I will not say a long time, as you can see by his appearance—on the islands, will give us an account of how geographical considerations, even more perhaps than geographical conditions, have affected the population in its movement. Mr. O'Dell is a demonstrator in the London School of Economics and assistant lecturer at the Birkbeck College under Professor Taylor. That is a liberal education. He went to Westminster City School and obtained a first-class at the London School of Economics, and at King's College the B.Sc. degree, which, I am told, is more thought of than that of Arts. He has studied the Shetlands in all their aspects, and a very fine and delightful place it is. He will now speak to us of it in a lecture which I will ask him to commence.

Mr. O'Dell then read the paper printed above, and a discussion followed.

Professor E. G. R. TAYLOR: I only want to raise two points with regard to the paper. As you will have observed, it is a purely academic paper, in the best sense of the word, and that allows me to make a remark about the difficulty and the doubt in some people's minds as to whether academic geography has any contribution to make to knowledge. In respect to that I should like to remind people that, even at the present day, we are still only beginning to turn out fully trained academic geographers; and when I say "fully trained" I mean those trained by teachers who have themselves been trained. We are only just beginning to get our second generation of fully trained and fully disciplined geographers, and the study we have just heard recorded is a type of study which the fully trained geographer is well equipped to carry out; a type of study, detailed and careful and necessarily quite unspectacular—it is not like climbing a mountain or discovering a new island—but a study which has very real importance because it makes, as it were, a primary contribution—we want of course multiplication of such studies—to what is one of the very big world problems of the day: that is to say, the problem of the mal-distribution—I choose the word deliberately—of population. That mal-distribution of population is of course intensified, because the ways in which it was blindly attempting to rectify itself have been brought to a standstill. Peoples to-day, as you know, have been frozen into immobility by legislation that prevents either emigration or immigration. With regard to the population question, it is only by means of careful small-scale detailed studies such as we have listened to, analysing the why and wherefore, and the results, of movements in the past—both free voluntary movements and involuntary forced

movements—it is only by means of such studies, carefully and systematically made, that we can hope to get any light on what I think you will agree is a matter of very real, not only national, but international importance.

Dr. DUDLEY STAMP: I feel sure you will all agree with me that we have enjoyed this afternoon far more than was promised by the mere title of the paper. The word "urbanization" may have frightened us, more especially as we knew there was only one urban centre to talk about. I think we have been brought to realize that there are parts of our own islands about which many of us know very little. I personally have learned much this afternoon by merely looking at the slides. It is true to say that half this country still does not know how the other half lives. We have had an interesting example of the way in which a young trained geographer, as Professor Taylor has said, can select from an immense amount of material and arrange his matter in such a way as to present a composite picture of interest and of real value.

One point has emerged which is, I think, of the utmost importance. Some economists are rather fond of telling us at the present time that geographical factors, which may have been of importance in life a few hundred years ago, are no longer significant. I think we have only to consider the maps of Shetland as shown on the screen to realize the full importance to-day of at least one geographical factor, the soil factor, in determining what we can do with our land and where the people of this world can live. I venture to suggest that we have had proof, from a detailed study of a small area, that geographical factors are not only just as important as they ever were, but, possibly, more important.

In the days of old, when with difficulties of transport and communication very many parts of the world had to be self-contained, the inhabitants had to do more or less everything for themselves: they had to spread as far as possible over their small sphere—such as the Shetlands—and make the best of it. To-day, with improvements in transport and communications, our everyday requirements, food and clothing, are being produced more and more in those areas which are geographically suited. There is thus a great and urgent need for detailed geographical studies of the character we have heard this afternoon in order that a proper estimate of potentialities of each area in the modern world may be made.

Finally, there is that all-important question which has been before this country as well as others during the last fifty years: rural depopulation. That is still going on. We as a nation are still increasing in size, not so rapidly now, and yet year after year we are using less and less of the surface of this country. There is a remarkable illustration of that in the Shetlands: an example of what is taking place elsewhere in the rural parts of the British Isles. Rural depopulation is a serious problem, and one which should be tackled from all angles.

I conclude by congratulating Mr. O'Dell very much indeed on the handling of his material and his presentation of it this afternoon.

Professor C. B. FAWCETT: I should first of all like to emphasize what Dr. Stamp has said in congratulating Mr. O'Dell upon his material. He has given us a good example of the careful study of a small area which is necessary as a foundation for any really sound work in human geography.

There is an interesting contrast between what I have noted and something which Dr. Stamp said in his, perhaps more lucid, presentation in the fact that the paper impressed me as being a good account of the great influence which changes in political and economic policy have had on some geographical distributions; since they have altered the balance of benefit gained by using different resources. Under one set of conditions the benefits to be gained from the fishing industry in the Shetlands were the most obvious, perhaps the most important and largest benefits to be gained at the time. Then there was a concentration of

population in the fishing villages by the shores. Under another set of economic conditions the chief profits were obtained from sheep rearing and wool, and the population became densest on the limestone areas. In a small and isolated area such as that described one gets a more direct picture of the results of such changes in the use made of the natural resources on the distribution of the people than is possible in some larger areas.

Such changes have had over the whole world, within the last hundred or hundred and fifty years, a very striking result in the steadily increasing concentration of population. I know the suggestion has been made this afternoon, not, I think, mainly by Mr. O'Dell, but perhaps by Professor Taylor, that this change of distribution of population produces a mal-distribution, and that it is a bad thing. Personally, I am not at all inclined to commit myself to a definite view as to whether it is bad or good. I think it is much too early to form such a judgment. The fact is that improvements, mainly in transport and in a general mechanization of many forms of toil, implied in that new and vigorously advertised word "Technocracy," enable mankind to make much fuller use of many of the natural resources of a country. Since we can thus obtain more produce, of many kinds, from the fertile lands, it follows that we tend to make less use of the relatively unfavourable areas, the more barren places; and those less attractive areas tend to lose their population by migration to the more attractive regions.

To regard ourselves as individuals, I think Mr. O'Dell represents not more than one generation back, as I do myself in my own life time, the migration from one of those comparatively barren areas of the country, the Shetland Islands or the Highlands, into those areas in which we find we can make a much better living. Whether that migration is producing what may be fairly called a mal-distribution of population is obviously a matter on which it is not easy to express an opinion. But it is a fact of real importance that this change in distribution is going on. And it is in giving us precise facts with regard to a particular instance in which the shift can be readily seen, that this study is specially valuable.

By making a detailed study of such an area, Mr. O'Dell has made a very real contribution to our knowledge; and he has presented his facts so clearly that I think we have all realized the main factors at work. I hope to be able to read his study more carefully at an early date.

The PRESIDENT: May I first add my congratulations to those that Mr. O'Dell has already received on his paper, and particularly on the trouble which he has taken to investigate the human problem. And may I express the hope that with the application he evidently possesses he will not stop there, but that he will carry his investigations into much larger problems than are contained in a small island of some 25,000 inhabitants—this of course he has only used as an example; that he will go on to the larger problems which lie before geographers in this branch of their activities. I will turn to those at once.

If the human element were withdrawn from geography—and I will not repeat the description which I have given more than once from this platform of what geography really means—the interest would of course almost disappear. You have heard my predecessor, and some may have heard me say too, that all study should lead to the happiness of the human race. So far as geography goes, if it were otherwise and only physical geography and its cartography were left, they would be objects of interest, of course, but the study would probably be a dull one. It is the effect of the physical on the human race which provides interest. That is why we welcome addresses such as that to which we have listened, and why we hope more and more to encourage those who study the human problem to come here and give us their ideas on these subjects.

What is it—and here I branch off from the problem of the Shetlands and

Faeroe Islands and cast our minds into the future—that occupies the mind of every thinking man and woman at this moment not only in this country but, I suppose, in all countries? More than any other individual question it is this: Where are the surplus populations of many countries to live in years to come? For, make no mistake, there is a surplus population, whether because of maldistribution or whatever other cause, when there is a real percentage of people who cannot find work. Some say that the population will be reduced. I am not one of them. For if there was to be a reduction it would entail reduction by unnatural methods, and nothing, to my mind—and I am giving my own opinion only—which has for its method that which is unnatural can be good. You heard, I think last year, that the proper population of this country was twenty million. It would be absurd to suppose that the population is likely to be reduced to that extent by unnatural means, whatever they are. Some say, of course, that there must be better distribution; that there is over-production and a surplus population, and if these could be brought together, all would be well. There is much to be said for that.

But to the geographer I would point out that the investigation of the possibilities of life in hitherto unoccupied countries is a duty. I am fully aware that it is going somewhat beyond the subject of our lecture, but it is a human problem. It is quite right, of course, and it is a fact, that all should aim at the best—like the word aristocrat in its proper interpretation. The Dominions insist on rigid and high standards of immigrants. The immigrant, if he does not insist, attempts to get to the highest standard of locality. Read Dr. Griffith Taylor of Australia on that subject. He put forward some very true and very unpopular views which were not accepted in Australia. You know what happens there. One of the reasons why that country does not want further immigration, which, mind you, they will be obliged to have in years to come, is that people go to work in the country. When there is a bad year in the country they flock into the towns. When there is a good year again in the country they do not go out of the towns because they have become accustomed, some to an entire inertia, others to greater comforts or greater facilities for amusement, or whatever it may be. They do not go back, and fresh people come in. In time more use will have to be made of that land than at present. In so many years from now the human race will be compelled to move or to die. There will be immense waves of immigration —I am not talking of the small affairs of immigrations of children to schools, in which I happen to take particular interest. The Matto Grosso—what will it hold? I was compiling figures recently with those who know the central part of South America, and they say it will hold two hundred million. People from Canada and elsewhere are even now, I happen to know from personal experience, settling to the westward, and such settlements will be greater. Not the Gobi Desert, but part of the north of Asia will probably be filled with human beings.

Those new places—and here I am particularly interested in what Dr. Stamp and Professor Fawcett said on the subject—filled with new people will have, in all probability, new laws made for themselves. You remember what was said with regard to rural depopulation, as to whether it is a blessing or otherwise. The earth is not being made proper use of if the rural population decreases. But in all new places there will be new ideas. Those who leave this country—and it may sound almost dreadful for a nationalist, which I am, to say this—will have to free themselves from their present ideas and set up a self-contained, self-supporting, perhaps less mechanical, age. I do not know. Anybody may fly kites as high as he likes. But in the end that is what the geographer should think of, and there he has food for thought: something that it will take him years to digest before he can produce anything in the way of a well-balanced study.

I am particularly glad to have had the opportunity of speaking on this subject this afternoon, because it would be foolish of me not to recognize that some—I hope not many—think that we in this Society pay too much attention to exploration, to travel, its excitements, its interests, its cartography, and too little to those more intensive studies of which we have had an example this afternoon and of which I have spoken. Believe me, that is a very mistaken view. I will not repeat what many of my predecessors and I have said on this subject, but I am reminded of a remark made to me some years ago by General Smuts when he said: "How hard is the way of the pioneer! How long it takes for posterity to recognize the work which he has done!" We claim, and I think we may do so with some justice, that we have, to a certain extent, been one of the pioneers in forwarding the teaching of geography as a whole—teaching and progress brought about through discussion and papers such as we have listened to this afternoon. Whereas a hundred and three years ago there was not a single professor of geography in this country there are now, I think I am right in saying, ten. Again, I am not so foolish as to think that the unaided efforts of this Society have created that most advantageous position; but when I mention such names as Murchison, Douglas Freshfield, John Scott Keltie, it will be agreed that we have done something to forward the study of geography in all its branches. If people will read the lectures given here as well as the papers which are published in the Society's *Journal* they will see that in nearly every one the human element is strongly emphasized. Only last week Captain Ejnar Mikkelsen spoke of Greenland, and the main problem which he had in view all the time was how to restore to that country the prosperity which once existed among the Eskimos. But for the fact that the one who was to have given the lecture is in China, I had in view a lecture on the Chinese floods, their cause and consequence, the combination of the physical and the meteorological which caused the floods, and then their consequences on the human race.

It is well said that the strength of the Dominions and this Empire, and the effect which they may have on this country, is their independence; and if I might make an analogy I would claim that the many institutions which have grown up and are now independent and strong owe a certain amount to the movement which may have been inaugurated by such men as I have spoken of.

It was with some regret that I read in a periodical a fortnight ago an article calling attention to the intolerant attitude of this Society towards the exponents of a new spirit in geography. I will not advertise the paper by mentioning its name. There was a remark about Mount Everest—a most human problem, all will admit—which if the writer of the article will think for a moment I am sure he will regret. I can assure you that all these institutions which have grown up and which are growing up to further that which we in this Society hold very dear have our wishes for their entire success, and that we will give them, so far as we can, every encouragement. Progress is made by harmony and not by friction. I make no apology, even in the correct sense, for saying what I have, for I am anxious that all should realize how very strongly we feel in this Society that we do desire to encourage the study of the human problem in every way, and how we believe that all our investigations, all our researches, have that one end in view; the betterment, the amelioration, of the condition of the human race.

I thank you very much, Mr. O'Dell, on my own behalf, on behalf of this audience, and on behalf of this Society, for your lecture, and I repeat, not from paucity of idea but from a desire to learn more, that I hope that you and young men of your age who are starting on this career, as Professor Taylor has said, instructed by those who themselves had learned what geography really means, will continue your studies, and turn your minds to this immense problem which lies before the world.

The Ngo Mon Gate of the Imperial Palace at Hue, Annam

Xieng Khuang, Laos: Meo type

Jiring, Annam: Moi type

SOME CONTRASTS IN THE CIVILIZATIONS OF INDO-CHINA: *A paper read at the Evening Meeting of the Society on 20 March 1933, by*

J. DELACOUR

BETWEEN 1923 and 1932 I have visited Indo-China six times. My first interest being Natural History, these expeditions were organized in order to carry out the survey of the fauna, birds and mammals particularly, which so far had been somehow neglected and remained little known. With the help of the Indo-Chinese Government suitable collections were secured all over the country, so that we now have a fair knowledge of its higher vertebrates, some two hundred new forms having been then found. I had of course to travel all over the country and to camp for weeks and even months in remote districts, so that I had many opportunities to come across various tribes of hill people and to visit many monuments and ruins. Although a mere amateur, I took great interest in them.

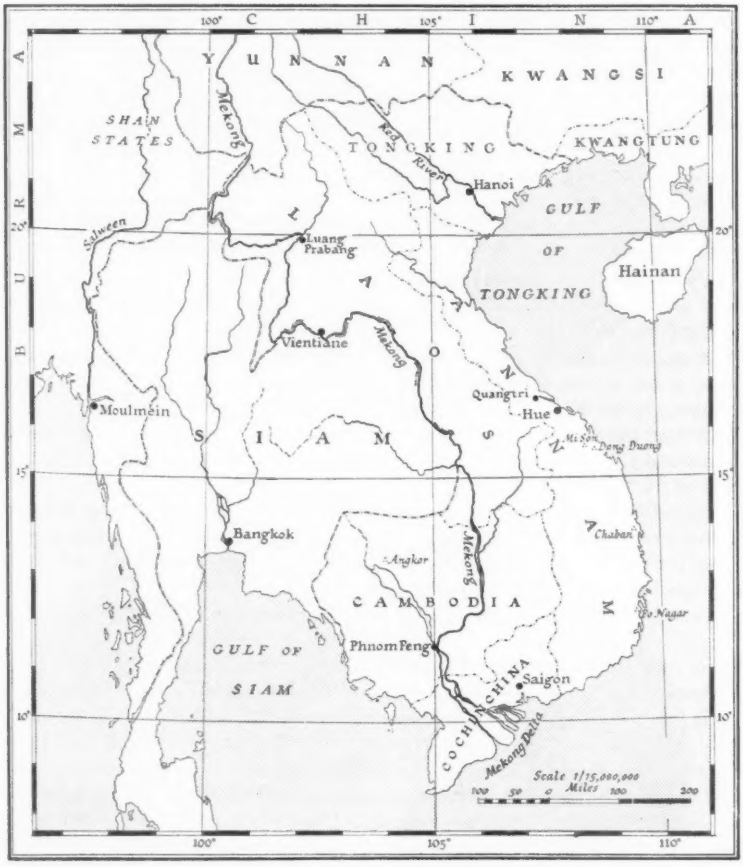
Fortunately, accurate and valuable information on the history, archaeology, and arts of Indo-China can be found in the remarkable work of the École d'Extrême-Orient, a Government Institution in charge of the care and study of monuments as well as the history and arts of Indo-China. For many years now, some of the prominent specialists in Far-Eastern culture have been working in the École. The information and explanations to be found in the following pages are based on their opinions, in particular those of MM. Louis Finot and J. Cœdes, past and present directors of the École d'Extrême-Orient, and of M. V. Goloubeff.

Indo-China—the name by itself suggests a mixture of the two great Asiatic influences. Being the south-eastern corner of the continent, Indo-China has been for the last twenty centuries and more the ground where they met, the Indians from the west, the Chinese from the north.

French Indo-China consists of a Union of five states: Cochinchina, Annam, Tongking, Cambodia, and Laos, the first-named being a colony, while the other four are protectorates, the whole country under the administration and authority of a Governor-General. Parts of Laos, Cambodia, and Annam have their own rulers, and Tongking belongs nominally to the Emperor of Annam, who, like the kings of Cambodia and Luang-Prabang (Northern Laos), is assisted by a Resident Superior. Indo-China is larger than France, Holland, and Belgium put together, its population being over twenty million inhabitants. It is situated entirely within the tropics, between 8° and 24° of north latitude; the climate is therefore warm, more even than warm in the south, with well-marked winters and summers in the north, but of course very variable with altitude and situation. Humidity also varies, but the whole country can be considered as damp, although there are long dry seasons in most parts.

The main feature of Indo-China is a long entangled and broken-up mountainous system, the Chaîne Annamitique, running the whole length from north to south; in the north it expands and joins the mountains of Kwangsi, Yunnan, and the Shan States; on the east there is a narrow coastal plain along the China Sea; on the west the deep and wide cut of the Mekong valley; and in the south

the vast low plains of Cochinchina and Cambodia, the latter having an isolated mountainous system along the Gulf of Siam. But the wealth of Indo-China is in the two highly fertile deltas of the Mekong in Cochinchina, and of the Red River in Tongking, which number among the greatest rice-producing districts in the world, and where the great cities of Saigon and Hanoi are respectively situated. As one can anticipate from such a varied topography and the diversity



Sketch-map of Indo-China

of altitudes, the flora and the fauna of the country are of the wealthiest. I have particularly occupied myself in the last ten years with some branches of its zoology, especially ornithology, but this is outside the scope of this study. I only want to say that no other part of the world could have afforded in present times more thrills and excitement to explorers in the way of striking discoveries.

Since 1923 I have spent almost every year six months in Indo-China, from

October or November to April or May. Each year the most striking districts, mostly the mountains, have been searched systematically for their mammals and birds. They have yielded the most unexpected novelties in the way of monkeys, rodents, game birds, pigeons, and especially Passerine birds.

To the diversity in the aspects of the country corresponds a diversity in the human inhabitants. Both deltas and the long narrow plain along the coast of Annam, between the Chaîne Annamitique and the sea, have a Mongolian population; the Annamites number about fifteen millions of clever and hard-working men, close to the Chinese in looks and habits, while Cambodia has its own race, the direct descendants of the Khmers. The Lao of the Mekong valley and the Tho of the lower hills of Tongking belong to the Thai race, like the Siamese. But all the highlands are inhabited by many different tribes, more or less primitive, semi-wild Indonesians in the southern half, Mongolians in the north. Indo-China has always been a transition zone. In prehistoric times it was a link between the Asiatic Continent and the islands of the southern seas. Later on, India and China met there. At more or less close intervals hordes poured down from Central Asia, while navigators landed from the southern archipelagos. Competition, struggle, and mixtures resulted, the newcomers always trying to appropriate the fertile lowlands and driving to the hills the former occupants.

From the remains found in the ground it appears that the first inhabitants of Indo-China were black Melanesians, related to the Nigritos of the Philippine and Andaman Islands. This has been made clear by the discoveries of Mansay (1906) and more recently by Mlle. Colani. In Neolithic times there was an immigration of Indonesians, and later on of Mongolians. The black type has now disappeared and traces of it can hardly be detected in a few districts; but according to Chinese chroniclers, who say "The inhabitants are black with curly hair," it was abundant still in the first centuries of the Christian Era. At the present day several well-defined races occur: (1) The Annamites, probably derived from a mixture of the former Indonesian inhabitants with Mongolian invaders, the latter being strongly dominant. They are small in size, with high cheek bones, slant eyes, straight hair, and yellow complexion. In the south, where there has been more Indonesian blood, they are darker, with sometimes slightly wavy hair. (2) The Cambodians, or Khmers, are also a mixed race, but strikingly different. They are taller and darker, their skin being brownish, with straight eyes and wavy hair. There, the Indonesians have been modified rather by Malay and Indian admixtures. (3) The Thai, who are found in Southern China, Siam, Tongking, Laos, and west to Assam. Like the Annamites, they spread from the north. The Laos are small and a rather dark brown. The Tho of Tongking are taller and have a light yellow skin. (4) On the highlands of Tongking, Northern Annam, and Laos different Mongolian races are found. In the central parts, at low altitudes, live the Muongs, who seem to be nothing but more primitive Annamites with a strong feudal organization. Higher up dwell the Man, the Meo, the Lolo, and a few other less important tribes; they have flat faces and light skins. They represent the remnants of different ancient Asiatic nations, driven south by the Chinese. They wear elaborate clothes. (5) In the centre and south of the Chaîne Annamitique, on its western slopes and foothills, live the numerous primitive tribes of Moi and Kha, some pure

Indonesians, others apparently mixed with Malay or other southern blood. Their skin is reddish bronze; they have straight eyes and wavy hair. (6) The Chams, who constituted a powerful nation of Indian civilization up to the fifteenth century, are now reduced to a few thousands, fallen back to a most primitive state. These are also Indonesians, with some Mongolian and Indian admixture.

All these different peoples speak special languages and differ widely from one another in religion, customs, and organization, as well as in appearance. Since prehistoric times rival civilizations have co-existed in Indo-China. It seems that the first influence was that of invaders from the southern seas, with the worship of the Sacred Bird and the Sacred Fish, and the supremacy of woman.

According to M. Finot and M. J. Prylusky, about the first century Indian and Chinese cultures brought in continental principles. The Annamites, long in submission to the Chinese Empire and in constant touch with China, completely adopted its civilization; they brought it down south gradually with their conquests, and they are keeping it at a high level in the present days.

Leaving out the more primitive hill tribes, the rest of the Indo-Chinese races have been in the past under the influence of Indian civilization. Indian culture was evolved to a very high level in two great nations: Champa in the east, and Cambodia in the west.

Both Khmers (or Cambodians) and Chams owe the element of their civilizations to Indian missionaries, who brought the principles of Buddhism and of Brahmanism at almost the same time, and both religions seem to have flourished side by side for many centuries. With them came the elements of Indian art. Both nations however soon ceased to have connection with India; their cultures followed a development of their own, a very happy one indeed, as in several branches of art they soon outpassed whatever Hindustan has ever produced. Cham and Khmer art however always remained entirely different. In the second century the Chams were already occupying the coast of Annam, north to Quangtri. They seem to have then received the Indian elements of their culture, which soon developed into a flourishing one. Up to the fifteenth century they constantly fought the Annamites who then occupied Tonkin. Several times they extended north, capturing and looting Hanoi, the Annamite capital, while they themselves were many times invaded. They also had war with the Khmers at different times. In the end however they were completely overcome and almost wiped out, the Annamites taking over the whole of the present Annam. Only forty thousand Chams still exist now, in a degenerate condition; they have forgotten the splendours of their ancestors and live in almost the same primitive way as their wilder relatives, the Moi. Of course, most of the population was gradually absorbed by the Annamites through intermarriage. But the Chams have left imposing monuments in the shape of beautiful towers, built of red bricks, with exquisite carvings and stone figures. There are also remains of their capital cities, at Tra Kieu and Chaban, and of great Hindoo sanctuaries at Mi Son and Buddhist sanctuaries at Dong Duong and Po Nagar. From inscriptions we have learnt the history of Champa, that of a brilliant and pugnacious nation, whose arts were brought up to a high level.

According to Finot, on the western side of the dividing range of mountains

Angkor Thom, Cambodia: the Terrace of the Goddesses

Angkor Thom: the Giants of the Pathway of Victory

existed, twenty centuries ago, the vast kingdom of Founan, extending all round the Gulf of Siam; little is known about it, but it certainly was under the influence of Indian culture. The Khmers, who formed in those days the small kingdom of Kambudja, tributary to Founan, inhabited the part of the Mekong valley now known as Lower Laos. In the sixth century their king conducted them south, defeated the king of Founan, and took his place. Cambodia developed rapidly into a highly civilized and artistic nation, of great power, with a large population. After various episodes, the history of which has been found written on their monuments, it reached its climax between the ninth and eleventh centuries. Then decadency began; the too rich and highly cultured Khmers could never resist long the blows from the barbarian Thaï, recently arrived in Siam from the north, and in 1350 the Cambodian king had to leave Angkor, his great capital, to retire to the south. Very quickly Khmer civilization declined, and at the end of the nineteenth century Cambodia was on the verge of total disappearance, overcome by the efforts of the Siamese and the Annamites. French protection only saved the Khmer kingdom and began to restore Cambodia, rediscovering, studying, and preserving the grand remains of its former splendour.

The quick disappearance of Cham and Khmer civilizations can be explained by the fact that, in both countries, only a small enlightened aristocracy, of foreign origin, was ruling over the dense masses of an ignorant population. After several long wars in which the leaders had almost all been killed, no one was left to take their place, and the downfall was almost immediate. The disappearance of Champa and the decadence of Cambodia consecrated as early as the fourteenth and fifteenth centuries the victory of Chinese over Indian influence in Indo-China.

Even now the struggle continues, if more peacefully; Cambodians and Lao are quiet and lazy people, who do not care to adapt themselves to any work connected with the modern development of their countries. Their territory is continually invaded by Annamite merchants, clerks, and workers, who gradually take their place. The time is not so very far off when they will be completely supplanted by their more intelligent and enterprising neighbours. It does not seem that there is room for them in a modern world, and whatever is done for their protection, it is to be feared that it will be in vain.

At the present day the contrast is still very striking, as well in monuments as in customs and aspects of the population. Along the banks of the Mekong, in Cambodia and Laos, one sees the yellow robes of the bonzes, gay-coloured silken sampots and sarongs and horned roofs, very similar to those of Siam and Burma, while the majestic ruins of Angkor and of scores of other towns and temples recall the glory of the old Khmers. They still show on their walls, beautifully carved, episodes of Ramayana and of Bhuddist and Brahmin legends. On the eastern side, on the reverse, while many Cham towers are still standing all over southern and central Annam, they only remind one, in spite of the efforts of their Annamite enemies to obliterate them, of a great and unfortunate nation who had brought Indian influence right up to the eastern shore of Asia. But the Cham towers are dead for ever, and everywhere one's eyes meet pagodas of Chinese style, yellow flat faces, large straw hats, black or white clothes which show Mongolian influence. In Hue, the capital city of

Annam, the sumptuous imperial palaces and tombs, with their coloured tiles, elaborately carved woodwork, gilt and red lacquered halls, have only slightly changed from the imported Chinese arts. The ceremonies and dresses of the court still are almost what they were in China in the Ming period, while rituals of the Han dynasty, some two thousand years old, survive in the wonderful sacrifice of Nam-Giao, offered to Heaven every few years, by moonlight, by the Emperors of Annam.

DISCUSSION

Before the paper the PRESIDENT (Admiral Sir WILLIAM GOODENOUGH) said: There is no more interesting study than that of the past civilizations, especially those of the East, more ancient, perhaps, than ours and more difficult therefore for us to understand. Moreover they constitute an essentially geographical study: what first introduced them; how they evolved, and especially how they expressed themselves in custom, ritual, and architecture. We are to hear of such to-night from M. Delacour, who will speak to us on "Some Contrasts in the Civilizations of Indo-China."

M. Delacour asks me to say that by vocation he is a student of natural history, and the subject on which he is going to speak to us is one that he only claims to have a passing knowledge of. M. Delacour is a Frenchman. I mention that because when he begins to speak you may not guess it. After having been at the University at Lille, where he took a degree in Science, he joined the Army, served in the War as Lieutenant of Infantry, and for two years was attached to the British Army as Liaison Officer, most of which time he spent with G.H.Q.

He has travelled widely in many countries: Venezuela and Madagascar, the East and the West; and has made no less than six expeditions in the country of which he is going to speak to us this evening. In his old home in Picardy, unhappily destroyed during the war, he has still a large collection of live birds to which he is greatly devoted, together with plants; and in his new home he has a zoological collection of some two thousand mammals. I mention these matters to indicate how wide are M. Delacour's interests.

M. Delacour then read the paper printed above, and a discussion followed.

The PRESIDENT: We have with us this evening Mr. Hudson, a Fellow of All Souls, whose particular work lies in the direction of oriental history. I will ask him to say a word or two.

Mr. G. F. HUDSON: I have listened with the very greatest interest, as I am sure you all have, to M. Delacour's lecture and immensely enjoyed the beautiful slides and films of Indo-China. It is very appropriate that we should have been given this lecture by a Frenchman, because the French, in addition to having been the pioneers in the study and interpretation of Chinese civilization, have almost a monopoly of Indo-Chinese studies. I should like to emphasize and endorse the tribute which was paid to the founders of the École d'Extrême-Orient.

M. Delacour has touched on the clash of Indian with Chinese civilization. In Indo-China the interesting part of that process, which has been going on for two thousand years, has been that first one and then the other of these two civilizations has gained the upper hand; that is to say, first the Indian and subsequently the Chinese. The Indian immigration into Indo-China round the Malay Peninsula appears, as far as can be established, to have begun in the first century B.C., and there are inscriptions and records going back to the first century A.D., though there is some dispute as to the oldest inscriptions we have. The Indian immigration was not confined to Indo-China; it established certain

colonies in Sumatra and even in Borneo, and of course that great colony in Java which is represented by the magnificent architecture of Borobudur. The civilization of Angkor, of which you have seen slides this evening, was an efflorescence from Indian colonies which appear to have been originally established at the mouths of the Menam and Mekong, and to have had their Indian culture assimilated by vigorous races coming down from the north, of whom the Khmers and Chams were the most notable. Later on, there were waves of later immigration from the north, represented by the Siamese and Annamites and, finally, by some of the Cambodian civilization. But it seems to me that there is a great problem, which has never been fully cleared up, as to why this civilization was so completely overwhelmed and why it has so far degenerated. Of course it is very easy to say that it was overwhelmed by the barbarians from the north, but then a barbarian invasion does not necessarily destroy the civilization of a land when it has been long established. Normally there is a period of destruction and then the vigorous incoming race assimilates the older civilization and makes something new, and perhaps greater, of it. But that did not happen in Cambodia, and although the Annamites had a culture of their own from China and the Siamese have also an interesting culture, nevertheless I think there has been a definite decadence from at any rate the thirteenth century, which affords a very interesting problem.

And as relevant to a purely geographical question there is the tentative theory put forward by Ellsworth Huntington and Visher that there has been a factor of climatic change. Huntington propounded that theory with regard to the Maya culture of Yucatan, maintaining that the climate in the parts of Yucatan where Maya culture specially flourished is to-day such as to be excessively unfavourable to human life or, at any rate, to a vigorous culture. He suggests that the solution is to be found ultimately in the shifting of the belts of cyclonic storms, and he attempts to work out a general theory of that kind with analogies from the fluctuations of rainfall and storm frequency with the eleven-year sun-spot cycle. That may seem a very fantastic theory, and I should like to hear whether any one can throw any light on that question, because I am ignorant in regard to it. But I feel there is a great historical problem in the decadence of this country and civilization which has produced some of the finest examples of Indian art and indeed of art in the whole world. It cannot be explained merely by saying that it was swamped by barbarian invasion, because it was as a matter of fact never completely destroyed, and as we have seen from the films, there are some very charming survivals of it.

The PRESIDENT: I am reminded of what I read in the Society's *Journal* some years ago when a predecessor of mine, not on this platform but from that in another hall, speaking after a lecture on Arabia, said to the lecturer, as I say to M. Delacour, "You have, indeed, stirred our imagination." You have, M. Delacour, given us a great deal of food for thought as well as a very charming and delightful evening. With regard to what Mr. Hudson has said, I do not know how long you are staying in London, but I hope for some time so that you and he can have some conversations on the subject, and I hope you will do me the honour of inviting me to come and listen to you and, if I may, throw in a question or two with a view to getting an answer to some of the questions which you have both advanced.

There is one thing on which we shall all be agreed, and that is a desire to render a tribute to the French Government generally in those parts for having assisted and encouraged the preservation of those very beautiful ruins and customs of all kinds. It has been of immense interest to see the pictures shown us to-night and to compare them with the Assyrian relics which we have in the hall, and

there must be hundreds of examples of a similar kind which occur to the minds of many present.

My business is a very agreeable one, M. Delacour, namely to offer you, with the very greatest sincerity, the thanks of this audience and the Society not only, as others have said, for the great pleasure which you have given us this evening, but also for the immense amount of work which you have done in years gone by. We assure you that whenever you care to visit us again we shall always be very glad to see you.

FURTHER REMARKS ON THE KHARGA OASIS

I. By MR. O. H. LITTLE, Director, Geological Survey of Egypt.

I SHOULD like to add a few remarks on some of the points raised in the interesting discussion on the "Prehistoric Geography of Kharga Oasis" in the February number of the *Geographical Journal*.

Prehistoric Springs.—I was in Kharga when the first prehistoric spring was discovered at Gebel Kharran, and on Miss Caton-Thompson's invitation visited it three times during the course of the excavations. Miss Gardner[1] has described the mound of this spring as formed of stratified deposits, somewhat irregular and very much disturbed near the middle. This agrees with what I saw in the excavations (which had reached a depth of 9 metres), and the deposits appeared to me to show no evidence of man's activities.

In 1909 Beadnell[2] suggested that when the Surface-water sandstone became exposed through the action of denudation on the overlying clay the water escaped through natural springs in very large quantities. Miss Gardner's work led her to accept this view, but to account for a linear arrangement of the springs in two directions, she postulated[3] that earth-movements, which need not have been violent, were responsible for the actual outburst. This would of course explain the origin of the springs, but I should like to point out that the first exposures of the sandstone would have taken place along watercourses eroded in the red clay and the most favourable sites for the occurrence of springs would be where lines of fracture crossed or coincided with these water-channels. One of the directions of the lines of springs is almost perpendicular to the present contours of the ground, but the other direction is at 45° to Miss Gardner's "possible line of disturbance."[4] In another spring mound a gravel bed derived from the eastern scarp had been washed down 18 kilometres out on to the site of the spring before its first outbreak,[5] which seems to indicate that water-channels existed.

Instead of being due to "increased head of water in the equatorial regions in the pluvial periods"[6] the violent emergence of the springs may have been accentuated by the water being warm and containing dissolved gases. The water of the Kharga wells is derived from the Artesian-water sandstone, and contains so much dissolved gas (principally nitrogen) that bubbles are liberated at the surface of some of the large wells almost as freely as if they were boiling. The discharge from the Rest-House well at Kharga (which is not one of the

[1] *Geol. Mag.*, September 1932
[2] 'An Egyptian Oasis,' 1909, p. 121.
[3] *Op. cit.*, pp. 417–418.
[4] *Op. cit.*, Fig. 9.
[5] *Geogr. J.*, November 1932, p. 385.
[6] *Ibid.*, p. 388.

largest wells) is 44 gallons per minute, and gas is liberated from the surface of the well at the rate of about 3 pints per minute. The temperature of the water as it issues from the bore is 88° F., but that of some of the other wells is as high as 98° F. I therefore think that when the first prehistoric springs issued from the untapped Surface-water sandstone the water contained a large amount of dissolved gas, under considerable pressure, which tended to produce a geyser-like effect. The water-bearing sandstone was near the surface and, whenever the springs became choked, the accumulation of gas under pressure (sometimes perhaps assisted by earthquake shocks) was sufficient to produce the eruptions which the deposits show to have taken place at different epochs. Further erosion of the overlying red clay permitted more and more water to escape from the Surface-water sandstone and gradually reduced the flow of the original springs until finally they were choked and buried beneath wind-borne material.

Mound-springs occur in Egypt at Ayun Musa, 15 kilometres south-east of Suez, but these mounds, unlike those of Kharga, have been built up of sand with diatoms, cemented by calcium carbonate deposited from solution.

Kharga Oasis between Neolithic and Persian Times.—The absence of archaeological "evidence for habitation of the depression by people of Egyptian culture in dynastic times"[1] may indicate that during this period the Egyptians did not occupy the Oasis, but the cause of this cannot have been lack of water. The original springs from the Surface-water sandstone may have been sanded up in Neolithic times, but water still flows from this sandstone in Northern Kharga, and certainly did so when the aqueducts were constructed there, so that it should have been obtainable during the preceding period from shallow wells or pits, if it did not actually issue at the surface.

Quite a small rainfall would have allowed man to wander over the limestone plateau during the winter, as at the present time the rare thunderstorms that occur farther north sometimes provide pools of drinking water which last for months. In December 1932 a pool was formed between Bahariya Oasis and Sittra, which was originally about a kilometre and a half long by half a kilometre wide, and this provided the water supply for the members of Mr. Walpole's survey expedition and fifty camels for over five months.

I imagine that the apparent absence of settlements was due to lack of knowledge of how to use the available water for agricultural purposes, and that the sequence of events in Kharga Oasis was somewhat as follows. Primitive man only cultivated land on to which the water flowed naturally, but the extensive system of aqueducts at the northern end of Kharga Oasis was initiated by people with a knowledge of agriculture and irrigation. Aqueducts were driven into the scarp just above ground-level, so that the water obtained from the Surface-water sandstone flowed on to the cultivable land in the neighbourhood, and when the construction began the sandstone probably yielded a plentiful supply of water and the tunnels were comparatively short.

Beadnell,[2] who explored one of the tunnels to the end, has shown that they are up to $4\frac{1}{2}$ kilometres long with vertical shafts to the surface of the ground every 20 metres, for removal of rock and for ventilation. These shafts are over

[1] *Geogr. J.*, November 1932, p. 405.
[2] 'An Egyptian Oasis,' 1909.

50 metres deep at the head of one of the long tunnels, and it could only have been in an endeavour to maintain the yield of a diminishing water supply that the tunnels were driven farther and farther into the foot of the scarp, until the labour involved was out of proportion to the small increase in flow obtained.

Tunnelling in the Surface-water sandstone of Northern Kharga would be superseded by the discovery of the method of sinking deep wells to the abundant supply in the Artesian-water sandstone, and this ushered in a new period of activity in Kharga. The discovery that water supplies could be increased by deepening wells was probably made in Bahariya or Siwa, where the water-bearing beds are near the surface. Most likely wells were sunk in Dakhla before the method was employed in Kharga, because in Dakhla it was only necessary to penetrate about 30 metres of stiff clay, while in Kharga at least 75 metres of clay and sandstone had to be passed through to reach the Artesian-water sandstone.

Permanent occupation of Kharga may date only from the time the aqueducts were constructed in Northern Kharga, but the Egyptians, at different periods during dynastic times, may have established frontier posts there. This would account for the references, perhaps somewhat exaggerated, to Egyptian domination of the oases which are to be found in the hieroglyphic records.

In conclusion I should like to express my appreciation of the valuable work which has been accomplished by Miss Caton-Thompson and Miss Gardner. It provides an excellent example of the benefits that can accrue when archaeologist and geologist combine in the investigation of problems of mutual interest and has resulted in important advances in knowledge concerning the archaeology, prehistoric geography, and recent geology of the northern part of Kharga Oasis.

II. By MISS E. W. GARDNER

Having just returned from a third season in Kharga I welcome the opportunity kindly given me by the Editor of commenting on the above discussion in the light of this year's work.

Mr. Beadnell raised three outstanding points in his discussion of our paper in the February *Journal* (pp. 128–134), namely: (1) the age of the Nile valley and Kharga tufas; (2) the condition of the oasis between Neolithic and late historic times; and (3) the origin of the underground water.

Miss Caton-Thompson dealt with all these questions in her reply (February 1933, pp. 134–139), and I agree with all she said; I wish here only to amplify some of the evidence.

(1) Most of this year's work has been devoted to a further detailed examination of the tufa; the majority of the Kharga outcrops were visited and two in the Nile valley in the hope of obtaining a correlation. The Nile valley outcrops were those north of the Kharga railway line near the village of Kara (an area of great importance omitted from Dr. Sandford's Survey), and the southern end of the outcrop in the bay north of Abydos, described by Dr. Sandford in the *Q.J.G.S.*, vol. lxxxv, 1929, pp. 513, 534.

At Kara there is a magnificent development of tufa and gravels, far better than that at Abydos, but in both areas the outstanding feature is a dissected plateau of gravel and massive tufa, the latter itself resting on gravel. Investigation showed that there is also a lower, and obviously later, series of tufas *in* the

wadis dissecting the Plateau Tufas. The Wadi-Tufa, as in Kharga, rests on a gravel-silt sequence and is dated by Palaeolithic implements *in situ* in the gravels to the Pleistocene period.

In the silts are the usual Egyptian freshwater shells, but also exotic European and Central African land forms, of identically the same species as those in Kharga (*Geol. Mag.*, 1932, p. 395). Miss Caton-Thompson has not yet seen the implements, therefore no exact dating will be given, but from drawings they suggest to her mainly a Middle Palaeolithic age.

At this stage, also, little more will be said of the shells, which await detailed examination, but it can be stated that this year's work has shown that the two types of land shells—palaearctic and tropical—cannot yet be separated in time. They are found together in beds ranging from Late Lower to Middle Palaeolithic, and any hope of using them for correlation purposes in place of implements must be abandoned. They are still however apparently confined to the "Wadi" type of tufa, no trace of them being found either at Bulaq Pass or in another very extensive Plateau Tufa outcrop farther south. Similarly no shells were found in the Nile valley "Plateau" type.

A close comparison can therefore be made between the Kharga and Nile valley tufas, and this was carried a stage farther at the end of the season by the rediscovery of some of Mr. Beadnell's lost leaf sites in the Nile valley in the Abydos "bay." Dr. Sandford was unlucky not to find them on either of his two visits (*op. cit.*, p. 514); they occur only sporadically in the low-lying Wadi Tufa, but are fairly abundant in a deposit fringing the eastern edge of the Plateau type. From a superficial examination some of the species at least seem similar to those from Kharga. The deposit in which they occur is a cavernous cellular tufa showing in places curving laminae like those of the Refuf terrace (*Geol. Mag.*, 1932, Pl. XXVII, fig. 2). It is at a slightly lower level than the massive Plateau type, and though not so obviously of later date must, I think, be attributed to the Pleistocene when taken in connection with the Kharga and Kara evidence, though in view of Mr. Wayland's very interesting results in Uganda a slightly earlier date is a possibility.

(2) With regard to the question of the general conditions in the oasis in early historic times, wide examination of both the north-west and eastern scarps and their passes has again failed to yield any evidence of extensive traffic or settlement in the oasis during the dynastic periods. At the head of a hitherto unmapped pass south-east of Bulaq a Third Dynasty bowl was found, and both here and on the most north-easterly pass (Gebel Yetsa) a considerable quantity of mat-impressed sherds were collected; these are at present undated, but believed by Miss Caton-Thompson to be of Nubian connections. At Um Dabadib however, where, judging by the extensive exploitation of the Surface-water sandstone supply in late historic times, water must always have been easy of access, no trace was seen of anything to fill the gap between the Neolithic and Persian or Roman occupations. Small Capso-Mesolithic flints abounded at the foot of numerous humps of red silty wash, which are a prominent feature of this area; but both here and on the high eastern plateau where similar tools were found, their distribution strongly suggested that their makers were living by pools of rainwater and were not utilizing the Surface-water sandstone supply.

(3) With regard to the wider question of the source of the Kharga supply in early times, Mr. Beadnell would evidently attribute a greater part to rainfall in pluvial periods than we see reason to do. He finds it difficult to conceive of the relative unimportance of such periods in Kharga (*op. cit.*, p. 132), while the Equatorial regions enjoyed much heavier rain. Granted however the existence of climatic belts in the Pleistocene, it seems to me reasonable to suppose that even during pluvial periods the present desert belts around the tropics of Cancer and Capricorn would have perished, albeit probably narrower and more subject to incursions from wandering storms. Kharga, in latitude 25° N., lay in this belt or on its northern fringe, and therefore the probability of any extensive increase in underground water from rainfall seems to me intrinsically unlikely, apart from the fact that this opinion is consistently backed by all the evidence available to date. Whatever appreciable increase in regional rainfall there might have been would have affected the country north or east of Kharga; in either case the general or local dip of the beds would have been against the possibility of its underground circulation to the oasis.

Finally, though fully agreeing with Mr. Beadnell on the necessity of further evidence for the source of the Artesian water and for the co-operation of the water engineer, I hope Dr. Ball will forgive me if I quote his recent verbal statement to me that not only has his belief in the south-westerly source of the Artesian water undergone no change, but that all the evidence accumulated since his paper was written in 1927 has strengthened it.

III. By DR. K. S. SANDFORD

In the course of a discussion on certain aspects of recent work in Kharga Oasis in the February *Journal* attempts were made to correlate deposits in the oasis with others in the Nile valley. The following notes were approved in draft by Mr. Beadnell, and on her return Miss Gardner has also, I am glad to say, expressed her agreement.

Mr. Beadnell rightly points out that the estimate of Pliocene age recently attributed to certain beds in the Nile valley[1] differs little from that generally held twenty-five years or so ago. He himself then called them post-Miocene and Pliocene. Needless to say, I entirely agree with him. He comments on my failure to find *recognizable* fossils in the travertines of Abydos, a success achieved there over thirty years ago which has just been repeated by Miss Gardner. The main travertines of the Nile valley over a wide area are full of unidentifiable pseudomorphs, and it should be noted therefore that the discoveries of well-preserved specimens seem to be limited to certain areas. Moreover we are led to believe that the newly found fossils represent a Pleistocene and not a Pliocene fauna, and on this account the Pliocene age of the travertine has been challenged.

If due attention is paid to the evidence set forth at some length in the paper referred to above, it will be found that the travertines or tufaceous deposits are intimate members of the Pliocene series that Mr. Beadnell and I have recognized. The deposits include breccias, conglomerates, tufas, marls, and

[1] *Quart. Journ. Geol. Soc.*, vol. lxxxv, 1929, pp. 493–548.

clays which were laid down in a gulf open to the Mediterranean, flooded and controlled by the sea to a depth of about 600 feet above its present level. The early Pleistocene *Sicilian* sea-level was at half that altitude. Moreover the gulf series is separated by high "Plio-Pleistocene"—probably *Sicilian*—river terraces from gravels containing crude Lower Palaeolithic implements. It is thus difficult to place the gulf deposits later in the succession than the Upper Pliocene, and in a forthcoming publication it will be shown that the travertines, with associated breccias and pebble beds, from Abydos northward into Middle Egypt, belong to the upper, *i.e.* later, part of the gulf series. The geological break of sequence is essentially between the gulf series and the highest river gravels, and on this account there is no reason to assume either that the gulf deposits are Pleistocene[1] or that their relegation to a Pliocene age depends on vague surmises, which according to Miss Caton-Thompson have hitherto existed with regard to the Pliocene age of the tufas near Abydos. Miss Gardner accepts, in her recently published paper,[2] the Pliocene age that Mr. Beadnell and I have independently attributed to the Nilotic series and turns it to the advantage of her argument. The abandoning of that conclusion would adversely affect her very interesting theory of pre-Pleistocene accumulation of breccia,[3] since, as I have already pointed out,[4] breccia overlies the travertines near Abydos and elsewhere.

The fact that the main tufaceous deposits are associated with the gulf series neither invalidates the Pliocene age of the latter, nor precludes the possibility that younger deposits of similar appearance may exist in the same districts. The latter is, I believe, the explanation of the difficulty that emerged from the discussion in February. Calcareous deposits have formed from time to time from the Pliocene to the present day in the Nile valley, as in Kharga, and I know of examples within the valley that can be dated by Palaeolithic implements. It seems unwise therefore to expect that the discovery of fossils in certain localities will disprove a conclusion founded on observation over a wide area, or prove more than the age of the bed in which they actually lie.

I suggest that Miss Gardner is probably right in assigning an approximate contemporaneity to the Plateau tufas of Kharga and to the kindred deposits associated with the gulf series in the Nile valley, and that Mr. Beadnell is probably right in regarding the Wadi tufas of Kharga as contemporary, more or less, with certain fossiliferous and tufaceous deposits in the Abydos area. But I believe the latter to be Nilotic Wadi tufas, *i.e.* later than the main Pliocene mass, perhaps contemporaneous with neighbouring implementiferous gravels and, like them, formed by streams descending from the Libyan limestone plateau to the Nile. They probably mark also, at least in part, the redeposition of the older tufa.

[1] Blanckenhorn ('Handbuch der Regionalen Geologie') has suggested on palaeontological evidence a Pleistocene age for the *Melanopsis* beds near Cairo; but he has pointed out that this is by no means universally accepted, and he has emphasized the contrast between these beds and the overlying gravels of the older diluvium (Pleistocene).

[2] *Geol. Mag.*, vol. lxix, September 1932, pp. 386–421.

[3] I am not prepared to accept the suggestion that the breccias indicate an arid climate. They are for the most part scree deposits and almost invariably pass laterally into water-worn pebble beds.

[4] *Quart. Journ. Geol. Soc.*, vol. lxxxv, 1929, pp. 493–548.

IV. By DR. JOHN BALL

We take leave to print as a contribution to this discussion the following extracts from a letter to the Secretary by Dr. John Ball dated Maadi, 23 February 1933:

"Apropos of the hypothesis which I put forward in my 'Problems' paper of 1927 concerning the underground water of the Libyan Desert, I would like you to know that everything which we have learned since 1927 is confirmatory of the hypothesis I advanced. The water-levels in six new wells sunk in various parts of the desert, including Bir Messaha and Bagnold's observations of the water-levels at Selima, Lagia, and Bir Natrun, are all in good accord with my hypothesis, and I am more than ever convinced of its truth.

"Of course in areas where the hitherto existing water-level data were very scanty the contours which I drew in 1927 could only be a first approximation, and a perfect accord with subsequently determined levels could not be anticipated. At Bir Messaha, for instance, the water-level was found to be some 50 metres below that which the 'first approximation' contours would suggest; but that well was sunk at a point 130 kilometres from the nearest known water-level north-east of it, and no less than 380 kilometres from the nearest known water-level to the south-west, so that a prediction of the water-level there could not be expected to be very accurate. What could be predicted however was that good water would be found there at no very great depth below the surface; and this prediction was fulfilled. Of course, now that we know the actual underground water-levels at this and the other new points, we can revise our first tentative contours, and thus enable further predictions of water-level to be made with a pretty close approach to accuracy."

SOVIET WORK IN THE ARCTIC

THE exploration and development of her Arctic territories is regarded by the Soviet Government as an integral part of the Five Year Plan; most of the work done in Polar regions by the Russians during the last twelve years has had the steady support and assistance of the State.

As early in the new regime as 1919 the Soviet Government had begun to realize the importance of the Arctic portions of the country, and a "Commission for the Exploration of the North" was inaugurated. It was attached to the Scientific-Technical Department of the Council of National Economics, the name of the commission being changed soon after to "North Scientific Trading Expedition." The last word is misleading, for this "Expedition" was in reality a scientific research institute for the organization of work in the Arctic, especially with a view to navigation, and the exploitation of the great mineral wealth of the northern lands. Twenty-three expeditions were sent out during the year 1921, and during the next few years work was being carried out over the whole western section of the Russian Arctic. In 1925 the Institute was again reorganized, and finally all the essentially practical work, such as fishery investigations, especially those conducted in the southern areas of the Russian

Arctic regions, were handed over to the Fisheries Institute, and the first "Arctic Institute of the U.S.S.R." came into being.

The Institute was designed to be the sole organizing centre for all Soviet work in the Polar regions, uniting under its control all branches of Arctic research. Its aims, as outlined by the statutes drawn up at the time of its foundation, and published in the English Section of its journal, *The Bulletin*, are as follows: It "elaborates the several designs regarding the exploration of the natural productive powers of the Polar regions of the Soviet Union; is endowed with the right of convoking conferences; carries on geological, geomorphological, hydrological, and hydrobiological investigations, geodetic and topographical surveys, zoological, botanical, and geophysical researches; investigates the routes and the means of air and water communication in the Arctic; studies deer and dog breeding, sealing, whaling, and all kinds of sea trading; carries on anthropological and ethnographical investigations, and examines the economics of the Polar regions." The Institute has remained under the control of the State, being attached to the Central Executive Committee, and thus has all the support, financial and otherwise, required for work of this kind. The fact that the work of Polar exploration has become the concern of the whole nation instead of, as in other countries, being the outcome of the occasional efforts of a few enthusiasts, must account to a large degree for the success of the whole scheme of the work of the Arctic Institute since its inception.

The chief work of the Arctic Institute is now to carry out effectively those portions of the Second Five Year Plan which have to do with the Arctic regions, and these resolve themselves mainly into making investigations into certain outstanding problems, the most important of which is the navigation through the Kara Sea to the basins of the Ob and Yenisei. The ice conditions of the Kara Sea vary considerably from year to year, owing, it is believed, partly to the fluctuations in the temperature of the Gulf Stream Drift, and partly to the direction of the winds. Lack of adequate knowledge of these factors prevents the possibility of any accurate ice forecasts, and until these are obtainable the Soviet dream of the proper expansion of her northern coast-line will have to be deferred. The effect of the temperature of the sea upon the fisheries is another problem to be studied, and there is room for investigation on the effect of the North Atlantic on the weather, not only in the immediate vicinity, but in Eastern Siberia also. Besides directing work on these questions which affect the entire State, the Arctic Institute is also at the head of all scientific Polar research carried on in the country, and most of the expeditions of the present day are working under its auspices, the Director, Professor O. J. Schmidt, having himself taken part in several ventures in the north.

In 1932 a map of the Severnaya Zemlya archipelago was published by the Arctic Institute. This was the result of work accomplished during the preceding two years by the party under G. A. Ushakov, which had been left by the Sedov Expedition to establish the Research Station on the Sergei Kamenev Islands. As a result of five strenuous journeys by dog sledge or on ski, the whole archipelago was mapped. It was found to consist of three main islands, the most northerly of which was named Komsomolets Island, and is divided by Proliv Krasnoi Armii (Red Army Sound) from Ostrov Oktyabrskoi

Revolyutsii (October Revolution Island). Bolshevik Island, the most southerly, is separated from the latter by Shokalski Strait. The rest of the archipelago consists of the Sergei Kamenev group, and a number of smaller islands. Capes and inlets have been called after prominent Soviet officials. A hitherto unknown island was discovered between lat. 79° 30′ and 79° 42′ N., and long. 77° 5′ and 76° 6′ E. It was named Wiese Island after Professor Wiese, who, following his deductions from the drift of the *St. Anna* in 1913, had told the expedition that they might expect land in that area.

In addition to their usual Arctic observations the Russians undertook a great deal of work in connection with the Polar Year. Their programme, which was to begin on 1 August 1932, was divisible into the following groups, but the results of all these expeditions are not yet available.

Group I.—To establish new observation stations and to relieve scientists in old stations.

(1) The ice-breaker *Russanov* was sent to land a party at Cape Chelyuskin and then proceed farther north. General Nobile made arrangements to travel with this vessel.

(2) The *Maligin* established a station on Rudolf Island in lat. 81° 47′ N. A party of four was landed: a biologist, a meteorologist, a wireless operator, and an industrialist.

(3) The *Soviet* was to relieve the station at Wrangel Island.

(4) Stations were to be constructed at Cape Severni and Cape Wellen.

Group II.—Expedition with special objects as well as for general observation.

(1) The *Sibiryakov* was sent to navigate the North-East passage. This expedition, which was led by Professor O. J. Schmidt, left Archangel on July 28 and made the whole journey from the White Sea to Bering Strait, a distance of 3000 miles, in nine weeks. The route chosen was by way of Matochkin Strait, Novaya Zemlya, to Dickson Island, after which Severnaya Zemlya was visited. From there the choice of route is interesting, as the expedition could have gone through either Vilkitski or Shokalski Strait between the mainland and Bolshevik Island and the two most southerly islands respectively, or by the route finally chosen, *i.e.* round Cape Moletov, the most northerly point of Komsomolets Island, using for this purpose a map compiled by Ushakov and Urvantsev of the Sergei Kamenev Islands Expedition. By taking this route the expedition was able to show that a course set through this region has an undoubted advantage over coastal navigation. The next port of call was Tiksi Bay, and in due course the expedition arrived at the Kolima. Conditions up to this point were favourable, but east of the Kolima heavy ice was encountered, and on September 18, off Cape Serdtse Kamen, a propeller was smashed, and the ice-breaker finally arrived at Bering Straits in a crippled condition. The last part of her journey was accomplished by means of an improvised sail and with the help of a favourable current.

(2) The *Taimir* was sent to the northern part of the Kara Sea.

(3) The *Lenin* was also sent to the Kara Sea.

(4) In the same group may be mentioned the *Krassin*, which was ordered to proceed as far north as possible, up to lat. 85° N., and winter there.

Group III.—Oceanographical work.

(1) The *Knipovich* (100 tons) made a first circumnavigation of Franz Joseph Land.

(2) The *Perseus* was also sent to the neighbourhood of Franz Joseph Land and Spitsbergen.

The incompleteness of the above list can be judged from their statement that the Russians now have seventy-six Arctic stations in operation. Parties have been at work regularly each year on all kinds of different scientific problems, at various points along the Russian Arctic coast-line, especially at the mouths of the rivers; and the permanent stations at Tiksi Bay, Dickson Island, Bulun, and other places testify to the success already attained in the opening up of the region. Hydrographic and oceanographic expeditions have also been sent out every summer, and there have been preliminary observations made with a view to future air routes in the Arctic. Other work of a less active kind is the compiling of the Arctic Bibliographies, which is a definite function of the Arctic Institute.

The station at Russian Harbour, Novaya Zemlya, includes measurements of the thickness of the land ice, to be made by seismic methods. These will be directed by Dr. Wolcken, who was a member of the Wegener Greenland Expedition, during the course of which similar measurements were made in more or less the same way. Another of the larger Russian stations is at Calm Bay, Franz Josef Land, which has been considerably enlarged with a view to the Polar Year activities, and is manned by a large staff. Dickson Island, Wrangel Island, Verkhoyansk, Bulun, Novokolimsk, Tiksi Bay (River Lena), Cape Wellen (Bering Sea), White Island, the river Khatanga region, Kotelni Island, and Cape Nordvig, are a few of the Siberian stations.

In conclusion one may mention the work done by ice-breakers. For some years now an annual expedition to the Kara Sea has been organized to open up the mouths of the Ob and Yenisei Rivers to trading vessels which carry an outward cargo of machinery, stores, and supplies, and return with flax, furs, graphite, mica, etc., the whole voyage taking about seven weeks. These expeditions are always preceded by ice-breakers. In 1931 this work was performed by the famous ice-breakers *Lenin* and *Krassin*. But the chief functions of the ice-breakers has always been concerned with the relief of other ships in difficulties in the ice, and some fine voyages for rescue were made during last winter.

This brief account of impressive activity is based partly upon a summary furnished by the Director of the Scott Polar Research Institute, at Cambridge, and partly upon information kindly communicated to the Society by the Secretary of State for Foreign Affairs. The contrast between the geographical ambitions of different Governments gives food for thought.

THE FIRST LONDON PROFESSOR OF GEOGRAPHY

HUGH ROBERT MILL

IN compiling a continuous history from fragmentary and unrelated data an author has either to be content with a jerky series of isolated statements or else to fabricate a smooth-flowing narrative by the hazardous process of jumping to conclusions. When one succeeds more by chance than good guiding, as the old Scottish saying goes, all is well; but when the leap in the dark lands one in a bog of error the author lays himself open to severe and not undeserved criticism. Within the last few months I have discovered that in the 'Record of the Royal Geographical Society 1830–1930' I made a deplorable *faux pas* in attributing totally wrong motives to the action of two eminent naval officers and the Council of this Society in the matter of an appeal from University College for financial help towards the establishment of a chair of Geography. It is a mitigating satisfaction that I am able to make this avowal and tender what I hope will be accepted as an adequate apology to the very gallant naval officer who now presides over our Society. I know that his genial friendliness will soften his professional indignation at the injustice ignorantly done to his predecessors.

On p. 40 of the 'Record' I wrote:

"The first Secretary, Captain Alexander Maconochie, R.N., served for six years, and on his retirement to take up more responsible duties abroad the Council recorded its appreciation of his 'sound judgement, even temper, and untiring zeal.' The soundness of judgement could not be expected to stand in all respects the test of the standards of a later generation, and one instance may be quoted in which a different decision might have had interesting results. University College, then styling itself the University of London, approached the Royal Geographical Society with a request for co-operation which is thus recorded in the Council Minutes for 28 September 1833:

" 'Received a communication from the Secretary intimating that the University of London was about to establish a Professorship of Geography and that it has been indirectly intimated to Captain Beaufort that if the Society would bestow a small endowment on the Chair the nomination of the professor would be ceded to it, to which, he, the Secretary, in concurrence with Captain Beaufort had replied that the funds of the Society were inadequate to such a purpose, especially as such a concession to one of the Metropolitan Colleges would warrant a similar claim from the other. Approved.'

"Thus the action of two naval gentlemen, unauthorized at the time, although approved afterwards, postponed for half a century a discussion of the duty of the Society towards the Universities which might have had a profound effect on the development of geographical science in this country."

And, as if this were not already too much, I returned on p. 247 to rub it in once more:

"University College received a snub a few years later from the gallant naval officers who then ruled the Society for requesting aid in giving to Geography the status of a University subject."

So much for the dismal morass of erroneous inference into which I floun-

dered when leaping, as I thought, towards the light from the little rock of fact—the Council Minute.

Now as to the real state of the case. Dr. Mawer, the Provost of University College, made reference in a letter to the Press last autumn to the existence of a chair of Geography at that college in 1834, and in response to my suggestion he very kindly caused a search to be made amongst the archives which brought to light the following records:

(1) "*Report of the Council to the Proprietors*, 26 *February* 1834. Under the heading 'Professorships':

"The Senate, considering that the University would acquire increased reputation and usefulness by extending the subjects of study, recommended to the Council the institution of Professorships of Geography, the Arts of Design, and Mineralogy; and the Council have the satisfaction of announcing the appointment to the first of these Chairs of Captain Maconochie, R.N., Secretary to the Royal Geographical Society.

(2) "*Distribution of Prizes*. [This took the place of College Calendars for some years.] Extract from Report of the Faculty of Arts, session 1834–35:

" '. . . The new features in our scheme are the Courses of Geography and History. Previous to the commencement of the present session no Chair of Geography existed in this country. General ignorance in consequence prevails respecting this science, and instead of maintaining its rank among the branches of intellectual education, it is not unfrequently considered a mere task for the memory of schoolboys. But those who assign to the Science of Geography this ignoble position can never have contemplated the grand field which it opens to the labours of the Professor; can never have reflected that its object is to explore the portion of space allotted to man; to pourtray his habitations therein, diversified as they are in geological structure, in climate, in vegetation, in animal life; to show their connection with his form, his habits, the temper of his mind, his language, his laws, his institutions; and to deduce general principles, by which, under similar circumstances, similar results may be inferred. The study of Geography, in this point of view, is peculiarly adapted to awaken inquiry, and to give liberal and enlarged views to the mind; it affords an easy and interesting exercise for the reason and the reflection, and without it the study of History can be prosecuted with little advantage. On these accounts it seems well fitted to occupy an early place in the series of studies which belong to general education.'

(3) "In the Report of the Faculty of Arts 1835–36 is a paragraph stating:

" '. . . The Classes which have not been opened are those of Italian, and the Oriental languages, Geography and Political Economy.'

(4) "*Annual meeting of Proprietors*, 22 *February* 1837. Under 'Professorships':

"The Professorship of Geography is still vacant. The late Professor, Captain Maconochie, resigned his office on receiving a Government appointment in a distant colony. This branch of learning, important as it is, and though recently become an object of public interest, seems not yet to be considered as a part of general education. Not even the acknowledged distinction of the late Professor could obtain a numerous class, and it may perhaps be a

consequence of this circumstance that no person whose eminence would justify the appointment has yet offered to fill the Chair."

With these new stepping-stones we can see that after the College's appeal for funds to found a chair in 1833 Captain Maconochie, the Secretary of the Society, accepted the Professorship, and we may well surmise that having this possibility in his mind he hesitated to ask the Society to help to pay him for work done outside while he was still the salaried Secretary. Having this view confirmed by Admiral Beaufort he took direct action in turning down the proposal and later received the Council's approval. He appears to have lectured for several terms to a diminishing class, and only ceased to endeavour to keep alive a spark of interest in Geography as an element in higher education with his appointment to a post abroad.

Therefore, so far from stifling the earliest efforts to provide University instruction in Geography, Maconochie made the most strenuous efforts to foster it, and I only wish that it were possible to look forward to a second edition of the 'Record' in which the due meed of praise could be accorded to him.

Dr. Mill mentioned the above in a much abbreviated form at the Afternoon Meeting on April 10. In reply the President said that he was sure neither Admiral Beaufort nor Captain Maconochie would have thought any apology necessary from one who had done so much to forward the activities of the Royal Geographical Society and to record its history with such accuracy; but that as an apology had been made he asked leave to accept it and to assure Dr. Mill, not only in his own name but in that of all his brother officers who had worked for the Society, that his, Dr. Mill's, work, joined him to their brotherhood for all time.

THE EASTERN LANDFALLS OF WILKES WITHIN THE AUSTRALIAN SECTOR OF THE ANTARCTIC

PROFESSOR WILLIAM HERBERT HOBBS

IN a paper entitled "Names on the Antarctic Continent,"[1] Professor Frank Debenham, the very able Director of the Scott Polar Research Institute, has discussed my recent paper entitled 'Wilkes Land Re-Discovered.'[2] Professor Debenham agrees that Wilkes discovered the coast of the Antarctic for the greater part of the stretch which he claimed between the longitude of 97° and 160° E., since this has now been confirmed for the coast between 105° and 150° E. It is particularly concerning the acceptance of Wilkes's Cape Hudson that he is in disagreement with the writer, and it will be at once conceded that the evidence is here of a somewhat different character from that for most of the landfalls to the westward.

Professor Debenham's principal argument that Cape Hudson is not a part of the coast of King George V Land, which was later explored and named by Mawson, seems to be that it was not described to be in the right direction, which should be south-west. Professor Debenham says of Wilkes: "Now

[1] *Geogr. J.*, vol. 81, no. 2, February 1933, pp. 145–150.

[2] *Geogr. Rev.*, vol. 22, no. 4, October 1932, pp. 632–655, pl. V, figs. 5.

errors of distance must be forgiven in so deceptive an atmosphere, but errors of direction simply cannot occur with navigators of his calibre."

Professor Debenham has not been alone in falling into this error, for error it can easily be shown to be, and I think this is explained by the relative inaccessibility of the official reports on the Wilkes Expedition.[1]

In the great atlas volume which accompanied volumes 1 and 2 of the official text there is a large-scale map of the Antarctic cruise.[2] Upon this chart the positions are given of the ships *Vincennes* and *Peacock* on 19 January 1840, when Cape Hudson was discovered by Wilkes. Upon the same map is shown the position of the Cape Hudson coast. From the ships this coast ranges in direction from a little east of south through south-south-west to south-west (S. 5° E. to S. 38° W.); varying but slightly as regards the two ships and but little between their morning and afternoon positions, owing to the narrow limits of the south-westerly trending ice-bay to which both ships were confined. Upon the same plates are printed two sketches of the coast made from on board the *Peacock*, and on these sketches a round-crested snow-covered elevation denominated a "peak" is represented in almost the exact centre. Underneath this peak in the centre is printed in small letters the words "Cape Hudson," which according to the legend "*bears south-west.*"[3]

According to the chart the bearing of this cape as the centre of the coast-line represented is south-south-west (more exactly S. 20° W.). Referring to Captain Hudson's journal, Wilkes says of the view of Cape Hudson from the *Peacock*, "It bore from them about south-west." Since no land at all is shown upon the chart in the south-east or even south-south-east, it seems quite clear that when Wilkes in the citation given by Professor Debenham makes the most distinct land to be in the south-south-*east*, it is a misprint for south-south-*west*, an error easily made at any time in proof-reading, and especially so before typewriters were invented.

The bearing of Cape Hudson from Wilkes's vessels is thus in reality the best evidence that his Cape Hudson was real, for the bearing of the centre of the Cape Hudson coast in correspondence with the label on the sketch, if continued, falls into correspondence with the higher projecting part of King George V Land behind the Cape Freshfield salient, which on Mawson's map with sketched contours is the most prominent of this coast.[4] The westernmost limit of this range of coast denominated Cape Hudson just reaches but does not

[1] Only one hundred copies of the full reports were printed by the Government, of which number twenty-five were accidentally burned. The remainder were distributed according to law to state libraries within the United States, so that few copies went to foreign libraries. There is no copy of this work listed in the catalogue of the Library of the British Museum. A cheap five-volume edition was privately published by Lea and Blanchard of Philadelphia, but this applied only to the narrative volumes and did not include the atlas plates that accompanied them. The full report issued by the Government between 1844 and 1874 consisted of eighteen volumes of text in nineteen covers, and eleven atlases. The size of the text volumes was $32\frac{1}{2} \times 24$ centimetres, and of the atlas pages $56\frac{1}{2} \times 37$ centimetres.

[2] Reproduced for the first time on a photostatic base by the American Geographical Society as plate V of my paper, 'Wilkes Land Re-Discovered,' cited above.

[3] "Peak bearing S.W."

[4] See Mawson, 'The Home of the Blizzard,' map of King George V Land in pocket of cover.

include Horn Bluff, the western limit of the series of black doleritic cliffs which according to Professor Debenham should be seen as Cape Hudson. This point is in any case one of small importance, since at that distance the upward refraction necessary to bring the high snow-covered hinterland into view would almost to a certainty leave the lower 1200 feet of black cliff eclipsed.

It needs to be stressed that any of King George V Land which could have been in view from Wilkes's vessel would be, not the coast at all, but the high hinterland of snow-covered knolls and ridges projected upward by refraction and seen against the floating ice masses of the sea in the foreground. This is what the sketches of Wilkes and his officers, including also the landfalls farther to the west, uniformly indicate. Moreover the sketch made of the Adélie coast six days after D'Urville, quite unknown to Wilkes, had sighted and sketched it, is nearly identical with D'Urville's sketch,[1] and this must speak for the fidelity to fact of both sketches.

In the sketch of Cape Hudson by Wilkes there is a central rounded snow-covered crest which is denominated "peak" in the legend and is much higher than the rest of the country represented. This may be due to distortion from mirage which the comparison of the morning and afternoon sketches form, but it may represent a higher crest in the background. This hinterland is known only from the sledge routes of Mawson and of Bage of his expedition. The latter on his route to the Magnetic Pole turned back at lat. 70° 36′, long. 148° 10′ E., where the altitude was 5900[2] feet, and where rounded ridges of snow cut off views in all directions. Two degrees to the southward and somewhat farther to the eastward Sir Edgeworth David determined the altitude of the plateau to be 7200 feet with a crest 7350 feet high not far away. We are therefore not yet in a position to say whether such a crest as is indicated by Wilkes at the middle of the first sketch behind Cape Hudson exists.

It is highly probable, though by no means to be assumed, that the rounded crests (Ringgold's Knoll and Eld and Reynolds's peaks) seen from the *Porpoise* on January 16 and located on Wilkes's chart, were snow-covered crests of the Antarctic hinterland; since the lines of sight extended over them correspond in direction fairly closely with the western salient of Oates Land, an apparent eastern salient of King George V Land, and that of the same land behind Cape Freshfield, toward which the line across Cape Hudson points. It is a characteristic of the inland-ice of both Greenland and the Antarctic that it rises generally higher behind such salients, and Mawson's contours indicate this to be true for the salient behind Cape Freshfield.

I am sure that Professor Debenham, or any one familiar with the character of the inland-ice, will agree with me that the rather sudden transformation of Captain Stenhouse's view of Cape Hudson into "Cape Flyaway" would be easily explained by the stepping-up of the down-slope wind over the ice-cap, which by raising the fine snow high in the air would blot out all features and transform the entire landscape into a grey haze.

As regards the naming of the Antarctic Coast I agree entirely with the proposal of Professor Debenham. If applied to Wilkes Land we should have Adélie Coast, Knox Coast, Sabrina Coast, etc.

[1] See 'Wilkes Land Re-Discovered,' fig. 3, p. 637.
[2] 'The Home of the Blizzard,' vol. 1, p. 296.

LAND UTILIZATION MAPS OF GREAT BRITAIN

IT will be remembered that, rather more than two years ago, Dr. Dudley Stamp, the Director of the Land Utilization Survey, read a paper at an Afternoon Meeting of this Society on the work of the Survey. He therein stated that "the primary purpose of the Survey is to make a complete record over the whole of Britain of the uses to which the land is put at the present time." In the interesting discussion which followed the reading of the paper several important points were brought out. For instance, Dr. Stamp told us that the original time allowed for the survey had been five years, but that such excellent progress had been made that it had been found possible to reduce that estimate. In the Second Annual Report on the Survey, which was dated 1 February 1933, it appeared that at that date there were only four counties in the whole of Great Britain in which work had not been started, that 88 per cent. of the country was being fully covered, and that over 90 per cent. of the work in hand was organized by the county Directors of Education.

In fact, the end of the field work of the survey is now in sight and the mean date of it cannot be far removed from January 1932. It is therefore practically certain that one of the main conditions of an efficient record of this kind has been fulfilled, namely the completion of the field work within the space of a very short term of years.

Early in this year two specimen maps were published by the Ordnance Survey showing, in colour, the cartographical results of the survey. The maps are on the scale of 1 inch to the mile. The colours which show the utilization of the land are overprinted on the 1-inch sheets of the Popular Edition, so that each sheet, in the normal case, covers an area of 486 square miles. The Popular Edition lends itself very well to this kind of overprinting, and no change seems to have been made in the printing of the ground work of the map, except that the minor roads are not coloured; over this familiar 1-inch map the special information is printed in six colours. The two sheets chosen, as the first examples of the results of this remarkable undertaking, are One-Inch Sheet 114, *Windsor*, which covers the area to the south-west of London; and Sheet 142, *Isle of Wight*, which embraces the southern part of the New Forest and Portsmouth. The sheets are well chosen as specimens; in the one we have a crowded urban and suburban region, in the other a largely unspoiled country area.

The general effect is clear and most instructive. Six colours have been used for the overprinting: dark green for forest and woodland; light green for meadowland and permanent grass; brown for arable land, including rotation grass; yellow for heathland, moorland, commons, and rough pasture; purple for gardens, allotments, orchards, and nurseries; and red for land agriculturally unproductive. It is a simple and easily understood scheme. As is stated in a leaflet which is issued with the sheets, "the chessboard of cultivation as it is revealed when we fly over the land in an aeroplane" is superimposed upon an ordinary topographical map. We have, in fact, much more information about the surface of England than we have hitherto been accustomed to, and it will not be at all surprising if this form of map ultimately supersedes the form at present in common use; the land utilization map is much the same as a mosaic of air photographs, only it has the advantage of being printed in colours. The ground forms moreover, which the air photographs cannot give, can be read by the contours on the new map. We have in the new venture more than a specialist map; we have a new type of topographical map, of interest and value to the public as well as to the specialist.

Technically the chief difficulty in the field survey must probably have been found in distinguishing the various categories of grassland; the permanent grass, which is coloured light green; the rotation grass, which is coloured brown; and the rough pasture, which is coloured yellow; and there must, in some cases, have been a difference of opinion as to which category a particular area should be relegated to. But the same sort of difficulty will occur with any classification. It is mentioned in the official leaflet that where the surveyor has seen land which has been under grass for several years, it has been recorded as permanent, and that much land which was formerly cultivated is included. In the same way, land which was formerly cultivated and has been allowed to fall into a still lower category, namely that of rough pasture, is marked as rough pasture.

Another rather difficult task, in some cases, must have been to decide upon the exact areas to be coloured purple, to represent gardens, allotments, orchards, and nurseries, and those to be coloured red, the colour chosen to represent land agriculturally unproductive. It is explained in the leaflet that the purple patches include land occupied by houses, but with gardens sufficiently large to be productive of fruit and vegetables; the same colour is used for orchards; it is possible that these might better have been coloured dark green, but that is a matter of opinion.

It is really surprising how well the little patches of colour, representing small fields, have come down on the map. If we take an acre as about 70 yards square, such a square on the 1-inch scale would be shown by a square of almost exactly one-twenty-fifth of an inch side. Squares of this size can be distinguished without difficulty and, of course the vast majority of fields are larger than this. To print such small patches requires good register on a large sheet, but this we expect, and find, in a map printed by the Ordnance Survey.

And now for a brief consideration of the uses to which these important sheets will be put. First, as has been mentioned above, they form a more complete kind of topographical map than any which has existed hitherto. The addition of so much extra information has, of course, the effect of somewhat obscuring the representation of the hill features; but these are still on the map, and can be read with a little care. There is no reason why the new map should not be of good service to the public at large; the picture which it gives of the country is a fuller one than that which is given by ordinary topographical maps. Secondly, the new series forms a kind of Domesday Map of the land of Great Britain. It is a record which will be of immense value in the future. Historians will have an authoritative document when they come to discuss the uses to which the land of this country was put in 1932. And, thirdly, subsequent surveys of a similar kind will, when compared with this pioneer survey, show, with exactness, the details of the changes which the land has undergone during the interval. We shall not have to depend only upon statistics, sometimes so difficult to interpret, but shall have definite information as to any alteration which may have taken place in each parcel of ground.

We are returning to the sane point of view that the land is a country's greatest asset, and that if a country does not make the best use of this asset it is not in a healthy state. Great changes in our economic condition are more than likely in the next generation or two. We may have to be satisfied with a humbler share of the world's trade, and, in consequence, may have to be content with a smaller population. Indeed, there are abundant signs of a diminution of the population at no distant date. We may hope for a less numerous but healthier race, less densely crowded in this narrow island, less industrialized, more self-sufficient. Agriculture will become relatively more important in the life of the nation, and the land utilization survey will be part of the apparatus of development.

In order that, in the future, full use may be made of these maps it is desirable that two steps should be taken. A certain number of copies of each sheet should be printed on specially durable paper and should be carefully protected from damp and light, so that they may be available for reference, in a perfect state, generations hence. And the plates of the 1-inch sheets, which form the background of the map, should be preserved for printing from, in order to facilitate comparisons of the successive editions of the land utilization survey.

C. F. CLOSE

It is interesting to note that the necessity for a land utilization survey and a co-ordinated plan for future development is being recognized in the United States. We have received from Mr. G. B. Cressey, chairman of the Department of Geography of Syracuse University, a pamphlet recording the Proceedings of a Land Use Symposium held last year at Syracuse under the auspices of the American Association for the Advancement of Science. The papers printed therein deal with the question of land utilization in its broadest aspect in relation to taxation, agriculture, forestry, erosion, etc.

One paper is especially interesting in relation to the British maps discussed above—"Planned Land Use," by L. R. Schoenmann, which is accompanied by a Land Use Plan in colours for Alger County, Michigan. It should be noted at once that the purpose of this survey differs from that of the Land Utilization Survey. It attempts to indicate "the use for which the land is apparently best suited by natural character and environment," whereas the latter of course merely shows the purpose to which it is put at present. Its findings will apparently be enforced as far as possible by the State Department of Conservation. The Land Use Plan distinguishes seven types, including cities and towns. All agricultural land is in brown, but six sub-types are distinguished by numbers, *e.g.* A2 is grazing type; A4 dairy-hay-potato type. The other main types are Forests, Wild Life Preservation, Recreation, Parks, Cities, and Towns.

The execution of this plan in Alger County would put approximately 15 per cent. of the county under agriculture in place of 8 per cent. in 1928, and would reduce private forests from 67 to 48 per cent., the balance becoming largely National and State forest. It should be explained that the latter change is possible because the public domain has increased rapidly through tax delinquency.

It is stated that New York was using a twenty-million-dollar bond issue to carry out a scheme of land utilization on specially selected lands, based upon a similar land use plan.

G. R. C.

REVIEWS

EUROPE

CORNWALL AND THE CORNISH. By A. K. Hamilton Jenkin. *London: J. M. Dent & Sons* 1933. $7\frac{1}{2} \times 5$ *inches;* xii + 308 *pages; illustrations.* 6*s*

Mr. Jenkin has already dealt with other aspects of the "Western Land" in his books on 'Cornish Seafarers,' the 'Smuggling, Wrecking and Fishing Life of Cornwall,' and 'The Cornish Miner.' In this book is described the old isolation of Cornwall, changed in the eighteenth century by the preaching of John and Charles Wesley, and later by the development of the coaching system, though the folk-lore and superstitions persisting from pagan times remained till quite recently. The narrowing peninsula is still to some extent the land of a race apart. Mr. Jenkin has diligently and fruitfully searched books, journals, newspapers, and other records, and crystallized the story of old-time Cornishmen against the inevitable day of closer assimilation of "Britain's Riviera" with the eastern and northern counties. It is a queer compound of ignorance, brutality, violence, drunkenness, heart-sickening poverty, gaiety, humour, and hard work. Among salient features are the miracle plays of the sixteenth century, acted over three days in the open air, the Church Ales, and Saints' Feasts. There is much interesting reading about roads and travel: in 1605 packhorses carrying bullion for the purchase of tin by the Crown were allowed ten days for the journey from London to Truro, and in 1663 the post from London to Penzance still took eight days. Travelling by Cornish vans, the local zest for "a good funeral," the drunkenness of the early nineteenth century, inns, kiddleywinks, and spirit shops, the contemporary fashionable gaiety of the local gentry, village customs and traditions, a rich hybrid folk-lore of giants, fairies, piskies, and knackers, the odd taboos of fishermen and miners—such is the material deftly and pleasantly handled by the author. Happily his method of treating a county by subject departments gives him leisure to illustrate fully by out-of-the-way facts and numerous stories. One would welcome an end-paper map of the county. S. E. W.

LE WEALD DES COMTÉS DE KENT, SURREY, SUSSEX, HAMPshire: étude de géographie économique et humaine. By Georges Lemaitre. *Paris: Les Presses Universitaires de France* 1931. $9 \times 5\frac{1}{2}$ *inches;* 414 *pages; illustrations and sketch-maps.* 30 *fr*

This work consists of three sections: the first a general introduction occupying one-sixth of the book, the second dealing with economic conditions to which more than half the space is given, and the third on the people of the region. The introduction is mainly on the physical geography; the economic conditions are considered under the headings of agriculture (first its development and general characters, and then the particular forms of cultivation, with hops given special prominence), pastoral work, forestry, fishing, industrial developments past and present, "residents and visitors," communications and commerce; the section on human life deals with the evolution of the population from prehistoric times onward, recent developments of urban and rural settlements and the present distribution of the people, the system of local government, social classes and land tenure, the "manner of life" of the landowners, farmers and farm labourers respectively, and a final chapter on the religion and character of the inhabitants. There are photographs of farms and farming, statistical diagrams, a small-scale geological map and "dot" distribution maps on a still smaller scale showing wheat, hops, fruit, and sheep in 1926, and population in 1821 and 1921.

The most useful parts of the book are the descriptions of agricultural and pastoral methods: these are very full, based on a wide study of sources, and clearly and interestingly written. Unfortunately however the physical basis of the study is open to question and the fundamental first section contains positive errors, *e.g.* the statement that the Upper Greensand is found "tout autour du Weald," while the human occupation of the central "High Weald" is said to be concentrated in the valleys, whereas even the map shows that the towns and villages are on the higher ground, and a walk from settlement to settlement takes one along the ridge roads and reveals the lack of houses and the frequently marshy condition in the valleys.

Again, it is said that the Gault clay "au nord, surtout entre Otford and Merstham, concentre toute la vie et tout l'interêt de la région [Holmesdale]." How can this statement be reconciled with the fact, obvious to any observer, that all the villages in this stretch of country have avoided the clay and established themselves on the Lower Greensand? Later, in marking out the natural regions, the author uses the term "Holmesdale" to embrace not only the valley north of Sevenoaks but all the country between Sevenoaks and Guildford, including the neighbouring Lower Greensand ridge with the great uplands of Leith Hill and Pitch Hill. This not only takes an unwarrantable liberty with a local terminology but masks essential geographical differences, and it is the more serious as the composite area thus formed is, in the later sections of the book, treated as a unit in connection with the types of farming and the distribution of the products. Statistics, however carefully calculated, based on units of this character, have little significance.

In the section dealing with the people of the region, the author has utilized many authorities and has collected and recorded information with assiduity rather than careful selection. The final chapter on the religion and character of the people assumes a "Wealden temperament" for which no evidence is offered.

As a whole, the book appears to have a literary rather than a scientific origin, and its value is diminished by numerous misprints, both in French and in English. There is still room for a systematic regional study of the Weald.

J. F. U.

LES HOMMES ET LEURS TRAVAUX DANS LES PAYS DE LA Moyenne Garonne. (Agenais, Bas-Quercy.) By PIERRE DEFFONTAINES. (Mémoires et travaux publiés par des professeurs des Facultés Catholiques de Lille. Fasc. XXXIX.) *Lille: S.I.L.I.C.* 1932. 10×6½ *inches;* xxxiv+462 *pages; illustrations and maps.* 100 *fr*

The author presents an elaborate study, on the sociological borders of geography, of the restricted area where the waters of the Pyrenees and Central Massif meet in the neighbourhood of Agen and Moissac. Here tertiary and alluvial deposits of great variety add to the geographical complexity of a district which lies at the junction of several more clearly defined areas. This land of "anarchical" relief has a climate which, according to the season, reflects Atlantic or Mediterranean influences, and is therefore adapted to the cultivation of a great variety of crops. Yet in spite of many natural advantages it has suffered at more than one period from depopulation, such as is causing anxiety at the present day. The author has searched historical records to find an explanation. Decay of handicrafts appears to have been a primary cause. In the eighteenth century the land was over-populated, owing to the multiplicity of occupations (cf. the coast-lands of Brittany). From the beginning of the nineteenth century the number of these gradually diminished, leaving agriculture the mainstay of the land.

But for a number of reasons agriculture found it hard to stand alone. Falling

returns to labour resulted in a falling off in employment and a rapid deterioration of the land accompanied by serious depopulation. Calamities more catastrophic attacked agriculture. Phylloxera and other blights, competition of American grain, and a decreasing demand for hemp and flax, which had been the staple articles of export, caused the farmer to turn more and more to cattle farming. This also led to a steadily decreasing demand for labour on the farms, where the large family became a burden rather than an asset.

With the passing of the wheat-maize system of cultivation an intensive polyculture has become the keynote of land utilization. Side by side with this, dairy-farming, based on an increased cultivation of fodder crops, is developing. The old twofold rotation of wheat and maize is replaced by the threefold rotation of wheat–maize–fodder, this being particularly marked in the area between the Garonne and Tarn, and bears a direct relation to the indraft of colonists from Aveyron and from Switzerland.

Naturally great efforts were made to stem the progressive depopulation of the countryside, and cheap land has for many decades attracted immigrants. Not all these efforts met with success. Vendéens to the number of about two thousand have developed dairying and fodder cultivation. A few Swiss have succeeded in establishing co-operative dairies. The best results have been obtained by the immigration of Italians from the plains of the Po, who have bought land, which they cultivate on sound principles, introducing new crops and methods. They rarely become naturalized however. Immigration has now practically ceased and a certain equilibrium seems to have been established, which entails leaving much of the less desirable land entirely or partially uncultivated, while intensive polyculture and dairying is carried on in the lowlying valley plains and near means of communication.

One gets the impression that the land has been "mined" by so many generations of small peasants, that only a large expenditure of capital could bring most of it back into tilth, and that the competition of lands nearer to industrial markets would prevent an adequate return to such expenditure. The real difficulty seems to be the lack of large-scale industry in south-west France.

M. Deffontaines has adopted a somewhat unusual method in the presentation of his most interesting thesis. An album of excellent photographs, followed by a series of descriptive notes, precedes a description and discussion of human settlement and activities. The reader, in the subsequent chapters, is led step by step into the past, beginning with the nineteenth century and working backwards, in order to estimate possible effects of historical events and customs on present conditions. As a method of research this may be admirable, but as a method of demonstration it appears to be both clumsy and confusing, entailing much repetition and frequent reference to facts and events only dealt with later in the book—and there is no index! H. O.

THE EVOLUTION OF MODERN EUROPE, 1453–1932. By Sir J. A. R. Marriott. *London: Methuen & Co.* 1933. $7\frac{1}{2} \times 5$ *inches;* xii + 432 *pages; maps.* 10*s* 6*d*

This outline is justified in the preface as an attack upon the subject from a new angle: it is to supply sufficient detail to enable the student "to understand the complex problems presented by the Europe of to-day." This surely is no new aim—nor is it carried out completely here. The subject-matter and treatment is more often national than European; considerable attention is given to the internal history of France and Germany, and comparatively little, for instance, to that of England or Russia. War and diplomacy bulk largely in these pages.

The book virtually ends with the year 1919: the account of the Peace Treaties

does not mention disarmament, nor the financial clauses and their results—matters of too obvious an import to-day. The book however gives a readable sketch of the growth of the present political units of present-day Europe and some indications of past international action, with indications of lines for further study.

G. R. C.

MODERN GERMANIES: as seen by an Englishwoman. By CICELY HAMILTON. *London: J. M. Dent & Sons* 1931. $7\frac{1}{2} \times 5$ *inches;* 252 *pages; illustrations.* 7*s* 6*d*

MODERN ITALY, as seen by an Englishwoman. By CICELY HAMILTON. *London: J. M. Dent & Sons* 1932. $7\frac{1}{2} \times 5$ *inches;* xvi + 230 *pages; illustrations.* 7*s* 6*d*

MODERN FRANCE: as seen by an Englishwoman. By CICELY HAMILTON. *London: J. M. Dent & Sons* 1933. $7\frac{1}{2} \times 5$ *inches;* xviii + 236 *pages; illustrations.* 7*s* 6*d*

We would have these books read by all readers of the *Geographical Journal*. They give a better idea than any others we have come across of the outlook of the great western peoples of Europe, of what are their aims, and of the lessons to be learnt from them—better because the outlook, the aims and the lessons are set forth with unusual observation, understanding, and sympathy. The author holds her own strong views but has endeavoured, we think with success, to make allowance for the prejudice that must arise from them; she has been helped to this by a sense of proportion that shows itself in many humorous flashes.

The books were published in 1931, 1932, and 1933 in the order given in the heading to this review. Since the one on Germany was written there has been rapid development of the political situation there, but it is a development easily understood from the conditions then described. Internal politics necessarily enter more into the volumes on Germany and Italy than they do into the latest one on France, where, though changes of government have been more frequent, changes in fundamental policy have been less profound. All three volumes give prominence to the training of children and the attitude of youth, the latter being specially coloured by what children have been taught about the war. The German child has been brought up to admire intensely the heroic deeds of the army, to attribute its defeat to causes which did not diminish its glory, and bitterly to resent the humiliation of the occupation and still more that of the imposed confession of war guilt. The French child is made to take pride in the endurance of France and in the achievements of her defenders, but the horrors, rather than the glory of the war are accentuated, and there is a tendency to teach the need for and the blessing of peace as its chief lessons. The young Italian, to whom not unnaturally the redemption of Italia Irredenta is presented as the central feature of the struggle, is taught to look on it as a record of success and patriotic achievement, and to feel intensely the splendour of patriotism and the need for military virtue. While all three countries exalt the deeds of their soldiers, the dominant feeling induced in Germany has been resentment, in France disillusionment, and in Italy self-glorification.

Germany set to work to counteract the effect on the future of the race of war malnutrition by special efforts to build up again the health and strength of children. Athleticism in all its forms—games, running, jumping, rowing, swimming, and hiking—is encouraged for the youth of both sexes to whom it is conscious health-education by means of which the general standard of the nation's physical fitness is to be raised. In Italy, since the advent of Fascism, games and sport have been recognized as an essential factor of the training of the

younger generation, though, in the case of the young women, athletic exhibitions seem to meet with but modified approval. In France games are not, as in Germany and England, an inevitable accompaniment of school and college life for girls, and for boys the game is treated as an end in itself, and not as in Germany with an eye to race improvement; in France also there is a movement of some strength against spectacular athletics.

The youth movements of Italy and Germany based on athletic training are largely associated with politics. When 'Modern Germanies' was printed the author anticipated danger from the premature entry of youth into the quarrels of political parties. The subsequent seizing of all power by the National-Socialists, while doing away with this danger, promises to result in Germany following Italy and Russia in the experiment of the mass production of the citizen, the whole educational system being made a factor in the maturing of the unitary spirit and the forming of that unitary political conscience which, according to Mussolini, is the true basis of the State. Democracy is of course already at an end when the Government is able to suppress all written and spoken opposition to its views and measures, and the suppression will be completed once for all if the new generation is imbued with the unitary political conscience. The strength of a Government which not only directs but also exclusively forms public opinion, is necessarily great compared with that of one in which policy follows the to-and-fro movement of different political parties. What will be the future of these two forms of government and their effect on the world's peace and on civilization is the large question which is brought up by the study of these volumes.

There are many other matters which the author discusses in all seriousness or touches on lightly according to the extent to which they indicate the present state and may influence the future development of the three countries. On the training of women and her position in the State she holds strong views which are not in sympathy with the generally conservative attitude of the Fascist party, intent on the full cradle, nor with the attitude, formerly of Kaiser Wilhelm and now of Adolfe Hitler, which regards domesticity as the ideal of German womanhood. She dislikes the exclusion of women from the suffrage to which more liberal France adheres, and she doubts the wisdom of the strenuous efforts made in that country to increase population. She is greatly impressed with one result of war and inflation in Germany—the desire for economy, simplicity, and health; this has achieved a new art by substituting plain surfaces and bright colour for ornamentation in architecture and furniture, discards superfluous clothing, and derives enjoyment from the beauties of nature and from the exercise of natural gifts. It is in Germany that architecture has achieved a real renaissance. In Italy no new form has been devised for the recently erected suburbs of Rome, but the claim of Fascism to be inheritors of Roman civilization has led to bringing into the planned city the remains of many of its ancient buildings. The author finds it difficult to feel any warm enthusiasm for some of the mushroom residences that fringe suburban Paris, and recognizes that, with six hundred thousand dwellings to be replaced in the devastated regions, mass production and therefore the commonplace were inevitable. She however reserves her scorn for the one-story dwellings with rough-cast walls, sham gables, and prawn-coloured roofs that are smearing the surface of rural England.

Space will not admit even the shortest summary of the author's views on many other circumstances and conditions in the three countries—on the French and German armies of to-day, on the territories reoccupied by France, and on those newly occupied by Italy since the war, on the amusements of the people—the cinema, the drama, and the opera, on their reactions to the foreigner, and on the various other aspects of life which she makes us see through her clear vision and

with the help of her sane understanding. There is no fear but that the reader who looks into one of her books will give careful attention to the whole of it.

M. N.

ASIA

BY THE WAYSIDE FROM JERUSALEM TO BAGHDAD. By MARGOT PRICKETT. *Darlington: James Dodds* 1932. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 126 *pages*

Travel in the Near East, which before the War was an adventure for the few, may now be enjoyed by all who can afford it. This book is the impressionistic record of a tour made by two ladies in the winter of 1924–25. The author, though she makes no claim to be more than "a passing tourist," observed with an artist's vision as they went, by motor car, through Palestine, Syria, and Mesopotamia; and these pages convey vividly the colour and atmosphere of Eastern cities and desert scenes, together with some historical detail.

From Beirut they visited the famous Dog River; then went by the Lebanons to Damascus, among whose fascinating streets, gardens, and bazaars they lingered; and made expeditions to Ba'albek and Palmyra. At Baghdad an introduction to a local official opened the way to Babylon, Kish, and Ur, and even enabled them to explore the Holy Cities of Kerbela and Najaf. After a brief stay at Basra they returned to Baghdad by the Tigris, spending six days on board the English boat—thus crowning their experiences with the "tranquil beauty" of the great river.

M. K.

THE CAMBRIDGE HISTORY OF INDIA (in six volumes). Volume VI (also published as Vol. V of THE CAMBRIDGE HISTORY OF THE BRITISH EMPIRE). The Indian Empire. 1858–1919; with chapters on the development of administration 1818–1858. Edited by H. H. DODWELL. *Cambridge: University Press* 1932. $9\frac{1}{2} \times 6\frac{1}{2}$ *inches;* xxiv + 660 *pages.* 30*s*

This volume falls naturally into two parts. Chapters I to IX deal with administrative development from 1818 to 1858, and include an account of the Mutiny; the remaining chapters carry the story of administration down to 1918 and deal also with foreign policy, particularly in Central Asia, and the political developments in India up to and including the introduction of the Montagu-Chelmsford reforms of 1919. The general editor, Professor H. H. Dodwell, claims in his introduction that the work gathers together "not only a wealth of personal knowledge and experience, but also the information scattered through a multitude of blue-books, of statutes, of acts of the Indian legislature" and that "at the present moment it aspires to show clearly and firmly the historical background, without some knowledge of which political discussions become matters of mere sentiment and chance." Both claims are fully justified, and the book will be read with care by all who have the interests of India at heart.

There is much too in this book of real value to those whose interests are geographical in the narrower sense. Of the articles with a more personal touch mention should be made of chapter XVII, where Sir H. Verney Lovett deals with the development of famine policy, and chapter XXV, in which Dr. C. C. Davies tells the story of the north-west frontier from 1843 to 1918. The conclusion of the latter that "the present administrative boundary, besides violating ethnic considerations, breaks nearly every requirement of a good frontier" is substantiated by arguments which repay careful study. Other matters of geographical interest include communications in eastern Bengal (pp. 31 and 251), and in Madras (p. 274); the material contribution of India to the war (p. 483); irrigation in the Punjab and the United Provinces (pp. 84, 283–286); and a

summary statement of the differences between Burma and India (p. 447). The editor, in a chapter on Central Asia, shows how Russian policy, whether Tsarist or Bolshevik, has changed but little throughout the period, and that in 1921 Afghanistan, "divided between the old world and the new, was once more precariously balanced between India and Turkistan" (p. 431), while Mr. Harvey, in his account of the conquest of Upper Burma, brings out the interesting point that "what forced the English to act [in 1885] was that France, having won an empire in Indo-China, now tried to dominate Upper Burma by peaceful penetration" (p. 437). Both writers thus confirm the declaration of St.John Brodrick that "the course of affairs on the Indian frontiers cannot be decided without reference to imperial exigencies elsewhere."

The book is provided with an elaborate bibliography on the lines well known to users of the various Cambridge Histories, but the absence of any kind of map is a very serious defect. J. N. L. B.

A VISIT TO MANCHUKUO. By H. G. W. WOODHEAD. A series of articles contributed to the *Shanghai Evening Post and Mercury*, October–November 1932. *Shanghai: The Mercury Press* (1932). $9\frac{1}{2} \times 6$ *inches; 112 pages; illustrations*

This is a reprint of articles originally written for the *Shanghai Evening Post and Mercury*. It gives an account of a visit to Manchuria made by Mr. H. G. W. Woodhead, editor of the *China Year Book* and formerly editor of the *Peking and Tientsin Times*. In the course of his tour Mr. Woodhead had interviews with the Chief Executive, Mr. Pu Yi, with the Prime Minister, Mr. Cheng Hsiao-hsu, and with the Foreign Minister, Mr. Hsieh Chieh-shih.

The interviews resulted in interesting information, set out with the clarity and economy of effort of a trained journalist, concerned in the main to give an objective account of what he saw and heard. "Among Chinese business interests," Mr. Woodhead says, "I was told there was a feeling of optimism when the independence of Manchukuo was first proclaimed. They expected that the Japanese would take prompt and effective action to restore order, and that with banditry eliminated, and the introduction of a stable currency system, trade would show a marked improvement. They no longer feel optimistic however. Outside official circles I met no Chinese who felt any enthusiasm for the new regime, nor did I meet a single foreigner who did not hold the view that an overwhelming majority of the better-class Chinese in Mukden are opposed to the establishment of an independent State under Japanese auspices." To this Mr. Woodhead adds: "Foreign business, except the trade in motor cars, petroleum products, cigarettes, and fertilizers, has been absolutely stagnant since last year. A number of foreign agencies have already decided to cut their losses, and withdraw." A third example of Mr. Woodhead's objectivity is the remark, "the task confronting the Japanese in Manchukuo to-day resembles in some respects that of the British during the guerilla war stage in South Africa, but on a much smaller scale, and with (relatively) much smaller forces. The aeroplanes give them greater mobility, but they are dealing with a much larger area and an infinitely larger population." (How much better it would have been, by the way, had the author substituted "very much" for "infinitely".)

Here and there however Mr. Woodhead becomes subjective in his treatment, evincing a perspicacity which makes one wish that he had allowed himself a little more scope in this method. He says, for example:

> "The Chinese population of Manchuria was not so resentful over the misgovernment of its late rulers as the Japanese would have the world believe. There can, I think, be little doubt that many Chinese regard an orderly

government, fixed rates of taxation, and stern measures for the enforcement of discipline as a greater affliction than exorbitant taxation which has an element of bargaining in it, and a *laissez-faire* attitude towards other administrative problems. Was it not the late Lord Cromer who said something to the effect that one of Britain's difficulties in dealing with her Eastern possessions was that their inhabitants were prone to prefer the worst government of their own devising to the best government imposed upon them from outside."

The International Settlement of Shanghai is not a British possession, and Mr Woodhead, the journalist, may perhaps take occasion to remind Mr. Woodhead, the Chairman of the British Residents' Association there, of that observation.

E. M. G

GEOGRAPHY OF EARLY BUDDHISM. By BIMALA CHURN LAW. *London: Kegan Paul, Trench, Trubner & Co.* 1932. 9½×6 *inches;* xxii+88 *pages; sketch-map.* 3*s* 6*d*

For information regarding the geographical conditions of India previous to the writings of the Greek historians and geographers and the Chinese Buddhist pilgrims our chief literary sources are the old Brahmanical, Jaina, and Buddhist texts. The first have been explored by various scholars; the second have not yet been systematically examined. Of the third we have texts in several languages, including Sanskrit, Chinese, Tibetan, and Pali. In this volume the author, who has devoted many years to Buddhistic studies, gives us a fairly complete compilation of such information as exists in the Pali Buddhist texts, which will be of considerable use to research workers, as it supplies carefully collated references to the texts in which the names occur. Unfortunately in a large proportion of cases the information given is insufficient for definite identification; and we do not find that Dr. Law has been able to help much in this respect. Exception must also be taken to a few of the statements made. For example, it is scarcely correct to say (p. xix) that Yuan Chwang "did not visit the south," as there can be no doubt that he travelled through Kalinga, S. Kosala, and the Andhra country as far south as Conjeeveram at least (and possibly farther), returning north by the Kanarese and Maratha countries and Gujarat. It is also, we think, misleading to say (p. 7) that the Mahagovinda Suttanta tells us that "India" was then divided into seven political divisions, as the enumeration in the passage referred to does not purport to cover the whole country, and includes but a portion of the north-central part of what we call India. To say (p. 6) that Anga "extended northwards up to the river Kosi" has no definite meaning, since the course of the Kosi is from north to south; moreover, Anga was probably bounded on the north by the Ganges. On p. 41 there is some confusion between Gijjhakuta and Indasalaguha. The former was a hill, the latter a cave in a different hill (Vediya—not mentioned by Dr. Law). Broach is not in Kathiawar (p. 57), but in Gujarat. The sketch-map will not bear close scrutiny, not having been accurately drawn. For instance, the river marked Kaveri is not the Kaveri, but the Ponnaiyar; the Pulindas have been shown where the Mekalas were; Magadha did not extend across the Ganges to the north, as shown; Takkhasila has been incorrectly located, and so on.

C. E. A. W. O.

THE MARTIAL RACES OF INDIA. By Lieut.-General Sir GEORGE MACMUNN. *London: Sampson Low, Marston & Co.* [1933]. 9×5½ *inches;* xii+368 *pages; illustrations and sketch-maps.* 15*s*

Sir George MacMunn has given us yet another book, a timely one, on the Indian soldier whom he knows so well. The late General Lovett's lifelike sketches and many striking photographs enhance its value. The note the author strikes in his

introduction recurs continually—namely that, should British control be removed, the yirile races would once again, inevitably, dominate the vast masses of India's unwarlike people, who include most of the educated classes. Out of her 350 millions India has but some three million men of serviceable age fit to bear arms.

The ethnology of India, the successive invasions of hardier races from the north—Tartar, Turk, Mongol, Persian, Afghan—and their impact on the existing inhabitants in the centuries before the coming of the British as traders pure and simple, fill the early chapters. The struggle between Britain and France for the hegemony of India is well told; how trader turned soldier; how "John Company" became a sovereign power in the land, until the crash of 1857. Later chapters treat, in detail, of the various races—Pathan, Sikh, Punjabi, Mussalman, Jat, Rajput, Dogra, Gurkha, Mahratta, etc.—who constitute the Indian Army, bringing out clearly the immense predominance in martial characteristics of the northern races. The services of Eurasians are not forgotten.

The author is a sturdy realist. His warm regard for the simple, loyal fighting men of India and their kin is equalled by his evident aversion to the politically minded seditious folk of the unwarlike classes. The final chapters, on the World War and the future, merit particular attention. Regarding the "indianization" of the Indian Army General MacMunn writes with judicial fairness. He admits the dilemma, and his solution of the problem of "Brindian" as an officer lies in his employment in Provincial rather than Imperial Forces. War is too serious a test to admit of probable failure. He points out a grave difficulty, the future of the N.C.Os. whose goal is the position of Indian officer of the present type. In the "indianized" regiment that goal disappears.

Certain minor defects should be mentioned. Frequent errors in spelling, even of proper names, *e.g.* Gardiner, Wish, Lovat (for Gardner, Whish, Lovett) indicate insufficient care in revising proof sheets. Surely the publishers might have corrected such obvious slips as Golgonda (for Golconda), federal (for feudal), unrevoked (for unprovoked), listened (for enlisted); and there are others. Warburton of the Khyber was Robert, not Richard. The old 14th (Murray's Jat) Lancers, now absorbed in the 20th Lancers, are unaccountably omitted from the pre-war "class" regiments composed exclusively of Jats. Reference to the official Indian Army list would have prevented certain mistakes concerning the Gurkha regiments.

These however are but trifling blemishes in a work of great interest.

M. E. W.

AFRICA

LE CHEMIN DE FER TRANSSAHARIEN. By André Maxime Schaller. *Paris: Librairie Istra* 1932. 9½ × 6 *inches;* 166 *pages; maps.* 15 *fr*

The bibliography of a Trans-Saharan railway is by no means scanty, but so important is this question that any new work is of value. It is a scheme which has been on the verge of adoption many times during the past fifty years, and M. Schaller's book is the latest contribution in favour of the construction of such a railway.

As an introduction there is a concise outline of the history of the pacification of Algeria by the French, which serves as an instructive foundation to the clearly conceived argument which follows. M. Schaller bases his argument mainly upon the success of developing an area round the Niger to the west of Timbuktu by means of a barrage on that river. This will fertilize areas which have hitherto been of no outstanding value, and considerable work has already been done, with every indication of a future prosperity. It is in order to join this territory with

Europe that a Trans-Saharan railway is necessary. If M. Schaller's arguments are sound, such a railway is essential to the prosperity of French West Africa.

The discussion of route is interesting, and one feels with the author that the eastern route is the more satisfactory. The conciseness of the book is an asset, and since the main criticisms of the opposition are also laid out, the author may be said to present a fair statement of the present situation. W. D.

AFRICAN TREASURES: sixty years among diamonds and gold. By WILLIAM P. TAYLOR. *London: John Long* 1932. 9×5½ *inches;* 288 *pages; illustrations.* 12*s* 6*d*

There is little of geography but a good deal of interest in this book, written by one who has taken part in the development of both the diamond and the gold-fields of South Africa from 1870 onwards.

The author sketches the early life of the Dutch pioneers in the Veld, who thought that they had inherited the land by the will of the Lord. Then came the Uitlanders from all parts of the world (but especially from England) to seek for diamonds and later for gold. No doubt much of the lack of understanding between Englishman and Boer can be traced to the difference in the early environment of these pioneers. The author deals with the development of the diamond and gold industries under the impetus given by men such as Cecil J. Rhodes, Alfred Beit, and others. The book consists of personal reminiscences, which all serve to emphasize the author's conviction that the prosperity of South Africa is still mainly dependent upon the mining industry. A. B.

THE COAST OF TREASURE. By LAWRENCE G. GREEN. *London: Putnam* 1933. 9×5½ *inches;* 270 *pages; illustrations and sketch-map.* 10*s* 6*d*

Mr. Green has written a book about the western coast of Southern Africa. Bushmen, Bantus, ivory raiders, diamond prospectors, lepers, hunters, and deep-sea divers are among the characters he encounters. He tells us of the adventures of caravels and galleons, slavers and steamers, whose remains lie beneath sand drifts or the rollers of the South Atlantic.

We learn about the pygmy Bushman who for centuries occupied alone and unchallenged the whole of Southern Africa; how he was driven from his lands into the mountains by more powerful negro races from the north. We are told of his desperate struggle with the black races, armed only with his puny poisoned arrow, until finally the advance guard of white civilization from the south forced the last remnants of his race to seek refuge in the waterless deserts of the Kalahari and the Kaokoveld.

The book has plenty of good material, but its lack of plan and fragmentary style make it somewhat jerky and awkward reading. A. D. L.

NORTH AMERICA

THE EXPLORATION OF WESTERN AMERICA, 1800–1850. By E. W. GILBERT. *Cambridge: University Press* 1933. 9×5½ *inches;* xii+234 *pages; illustrations and maps.* 12*s* 6*d*

In 1800 a vast portion of North America between the Mississippi and the Pacific coast was unexplored; within this area lay the Great Plains, the Rocky Mountains, the interior desert basin, the Sierra Nevada, and the Cascade ranges, with their varied natural regions. Mr. Gilbert narrates, with great attention to the geographical background, the course of those expeditions, which by 1850 had determined the main outlines of these features—a task which till now, surprisingly enough, has remained undone. Settlers pressed closely upon the pioneers,

and political complications of moment for the United States arose rapidly, so that the work of the explorers was obscured, and has by comparison been neglected, though Roosevelt had reached the earlier years in the fourth volume of his 'Winning of the West,' and the geographical aspect had been treated generally by Miss Semple and Professor A. P. Brigham, among others.

Mr. Gilbert begins with a systematic description of the physiography, climate, vegetation, animals, and Indians of the region, illustrated with well-chosen extracts from the explorers' journals. He then deals with the exploration proper. The main landmarks are Lewis and Clark's great journey from the Missouri to the Columbia; the discovery of South Pass; and Fremont's work in the Interior Basin. The importance of South Pass, over which wound the Oregon and California trails, is rightly stressed. The historical cartography of the area also receives consideration. The book is accompanied by a good bibliography, and clear sketch-maps.

Two points occur to the reader of this work: first, the value of the explorers' accounts in impressing geographical facts upon the imagination, and secondly, the extent to which the quotations in the first descriptive section, by anticipating them, detract from the interest of the actual narratives of exploration which follow. Would it not be more logical and effective to reverse the order of the sections, and place the explorers' experiences first? Or better still, might it not be possible to combine the history of exploration with the purely descriptive section?

In his preface Mr. Gilbert claims that the reconstruction of such scenes as this, *i.e.* Western America in the first half of the nineteenth century, is the true function of historical geography. He has certainly done much to ensure the recognition of this claim—though in many regions the work of reconstruction requires the co-operation of other students with the geographer. G. R. C.

NARRATIVES OF THE TRANS-MISSISSIPPI FRONTIER. General Editor: CARL L. CANNON. *Princeton, N.J.: University Press* (*London: Humphrey Milford*) 1932. The Emigrants' Guide to Oregon and California. By LANSFORD W. HASTINGS. Edited by CHARLES HENRY CAREY. 9×5½ *inches;* xxx+158 *pages; portrait.* 18*s.* Hall J. Kelley on Oregon. Edited by FRED WILBUR POWELL. 9×6 *inches;* xxii+412 *pages; map.* 21*s* 6*d.* Scenery of the Plains, Mountains and Mines. By FRANKLIN LANGWORTHY. Edited by PAUL C. PHILLIPS. 8½×5½ *inches;* xviii+292 *pages; illustrations.* 21*s* 6*d.* Scout and Ranger: being the personal adventures of James Pike of the Texas Rangers in 1859–60. Edited by CARL L. CANNON. 8½×5½ *inches;* xxviii +164 *pages; illustrations and portrait.* 15*s* 6*d*

These are four further volumes of the series already noticed at some length in the *Journal* for March. Two of the present volumes are largely concerned with the settling of Oregon and the boundary controversy. Kelley, influenced by reading the account of Lewis and Clark's expedition, was moved to organize a party to migrate to Oregon in the thirties. The enterprise failed completely, for Kelley was no leader, but his continued appeals for compensation, combined with information on the new lands, no doubt maintained interest in Oregon. Hastings, about ten years later, accompanied a party to Oregon, but, being disappointed with the prospects, later led some of the party to California. His "Guide" advocates the latter as a more favourable field for immigrants than Oregon.

Among those attracted to California by the finding of gold was Franklin Langworthy. He was a man of some education, and appears to have supported himself by popular scientific lectures. His book is the most readable of this

group. He was an observant traveller, and gives a good picture of the trials and experiences of a journey from Iowa across the plains to South Pass, Salt Lake City, and Sacramento.

'Scout and Ranger' lives up to its title. The author, a grand-nephew of the famous Z. M. Pike, served in 1859 with the Texas Rangers against both the Comanche Indians and the turbulent white element. His account is written in a true "Wild West" style. G. R. C.

CENTRAL AND SOUTH AMERICA

UP THE AMAZON AND OVER THE ANDES. By VIOLET O. CRESSY-MARCKS. *London: Hodder and Stoughton* 1932. $9\frac{1}{2} \times 6\frac{1}{2}$ *inches;* 336 *pages; illustrations and sketch-map.* 12*s* 6*d*

This is the story of a very remarkable journey along the route roughly indicated by the title: a journey which would be adventurous enough for any traveller. Determination is the principal characteristic of Mrs. Cressy-Marcks's equipment as a traveller, and she could not have hoped to accomplish this journey without a fine disregard for safety and personal comfort; although it is true that once or twice the delights of hot baths or even of hot water awake a lyrical note otherwise lacking in a rather pedestrian narrative. She has a strange tale to tell of endless obstacles and hardships surmounted by iron determination, and it is a pity that she has not the art to convey to the reader all the excitements of her adventures and the wild beauty of the country.

Nevertheless parts of her story cannot fail to impress: the suicide, after a last elaborate shave, of the delirious Czecho-Slovakian Antonio Vlhesek, with whom and four Indians Mrs. Cressy-Marcks was travelling in a canoe above Atalaya; the scenically grand but appallingly difficult stretch of trail in the Andes between Ocopa and Huancayo; the vision of Señora Skinner "armed with a stick and a tongue" chasing away a full-grown "tiger" from her succulent Lima chickens while Mrs. Cressy-Marcks was looking for her Holland and Holland ·375. These and many other vivid touches fully compensate for some commonplace observations on the civilized parts of the journey.

The general map is so sketchy and so empty of names as to be useless to the reader, who will get more help from the map of northern South America in any fairly good atlas; so remarkable a journey deserved a better map. A series of appendices dealing with personal and camp equipment and scientific instruments is interesting and useful. D. C. S.-T.

EN LOS CONFINES DE LA SELVA LACANDONA: exploraciones en el Estado de Chiapas, Mayo–Agosto 1926. By ENRIQUE JUAN PALACIOS. Contribución de Mexico al XXIII Congreso de Americanistas. [Published under the auspices of] Secretaría de Educación Publica. *Mexico: Talleres Graficos de la Nación* 1928. 13×9 *inches;* 212 *pages; illustrations and map*

ESTUDIO ARQUITECTONICO DE LAS RUINAS MAYAS. Yucatan y Campeche. By FEDERICO E. MARISCAL. Contribución de Mexico al XXIII Congreso de Americanistas. [Published under the auspices of] Secretaría de Educación Publica. *Mexico: Talleres Graficos de la Nación* 1928. $12 \times 15\frac{1}{2}$ *inches;* 110 *pages; illustrations and plans*

The first of these two publications, issued by the Mexican Ministry of Public Education, describes an exploratory trip made through parts of Chiapas by the Mexican archaeologist, Enrique Palacios. Chiapas, the south-western state of Mexico, contains large areas about which very little is known. It is a state of

amazing contrasts, possessing, on the one hand, great stretches of unexplored tropical forest, on the other, areas of considerable elevation (about 5000 feet) where the dense rain forest gives way to pine woods and coffee plantations. The western half of the state was a former centre of the Maya civilization, and there still exists a large aboriginal population speaking Tzeltal and other Maya languages.

In the valley of the Dolores river, a tributary of the Jatate river and part of the vast Usumacintla–Lacuntun drainage, Mr. Palacios discovered a number of unreported Maya sites. Of these the most important was Santa Elena Poco Uinic, situated on a hill not far from the source of the Dolores. The whole of the summit of the hill had been levelled to form a large plaza of typical Maya formation, some 65 feet above the surrounding terrain, and supporting numerous pyramidal constructions and mounds. The buildings and sub-structures are faced with well-made and well-squared limestone blocks of a perfection not typical of this general region. Their presence is possibly due to a better quality of limestone in the immediate vicinity. Seven stelae and altars were found at this site, of which only one has decipherable dates. This, a magnificent monument 15 feet high, was dedicated towards the end of the "Old Empire," bearing a date equivalent to 10 September A.D. 790 in the Goodman correlation.

Numerous other minor sites are fully described, but the book would have benefited by larger-scale maps. Mr. Palacios skilfully combines much important information on Chiapas with a charming account of the personal side of his work.

In the second publication Mr. Mariscal has brought together for comparative purposes much material on Yucatecan Maya architecture together with original plans and elevations of many important structures. These drawings and measurements, which contain much careful detail, will prove invaluable. They are all drawn to the same scale. One section is devoted to the recently discovered Maya site of Etzna in southern Campeche, and there are comparative studies of doorways and porticos from various sites. J. E. T.

AUSTRALASIA AND PACIFIC

AUSTRALIEN UND OZEANIEN. By WALTER GEISLER. Third revised edition. (Allgemeine Länderkunde.) *Leipzig: Bibliographisches Institut* 1930. 10×7 *inches;* xii+424 *pages; illustrations and maps*

The third edition of the volume upon Australia and Oceania in this well-known series of regional geographies was undertaken by Professor Geisler, now of Breslau. The series contains Philippson's 'Europa' and Jaeger's 'Afrika,' and the standard set in those volumes is worthily maintained.

So radical have been the changes and developments, especially in Australia and New Zealand, that the second edition of 1902 had to be entirely rewritten. To this end Dr. Geisler spent one and a half years mainly in the two Dominions: he travelled extensively and crossed Australia no less than five times. His text therefore for these areas rests on first-hand experience supported by published materials; for Oceania he relies on the extensive documentary sources alone. (The bibliography covers nine double-column pages.)

The general plan of the series has imposed something of a set form. The introductory section defines terms—Dr. Geisler rightly rejects the use of the term "Australasia"—and outlines the stages of discovery and exploration. A substantial section is then devoted to sketching the general features of the area taken as a whole. This is followed by a detailed regional description of each part—the Commonwealth, New Zealand, Oceania—while the concluding section surveys the economic and political geography of the area and has an appendix (14 pages)

of statistics. The work is admirably illustrated with pictures, maps (including several pictures and four maps in colours) and diagrams, and has a bibliography (*v. sup.*) and index.

The public for whom this work is written and to whom, as the author remarks, the region is apt to seem remote and unfamiliar will find it informative and useful. The regional descriptions, which comprise over half the book, cover the ground steadily, and wherever they have been used or tested by the reviewer have been found accurate and serviceable. The regional divisions adopted follow in the main, but not entirely, those marked on the map (p. 128). This map—published first, apparently, in the *Geographische Zeitschrift*, 1928, viii—appears itself to be a development, or revision, of that in 'Koloniale Studien' (1928, p. 201). Dr. Geisler, indeed, seems to feel some uncertainty about the geographical divisions of Australia: this is understandable, and the comparison of his "regions" with those suggested by others is interesting. Noteworthy also is the omission of any reference to his earlier estimate of the population capacity of Australia ('Koloniale Studien,' *l.c.*, and *Geographical Journal*, 1928, November, p. 468).

It is however in Section 2, "Der Erdteil Australien im Überblick," that the weakness imposed by the set form is revealed. The term "Australien" ("Der Erdteil Australien") signifies Australia (including Tasmania), New Zealand, and Oceania (New Guinea, Melanesia, Polynesia, Micronesia). Though Dr. Geisler definitely states this (p. 32), he does not uniformly observe it. Thus New Zealand in some places is regarded as part of "Ozeanien," in others it is included in the "Inselwelt." The grouping, in fact, seems to differ with the subject, and the treatment of Australia is no less confusing. To this must be added the difficulty of treating an area so extensive, discrete, and diversified as one whole. Apart from somewhat empty generalizations, "general geographical features" tend to become little more than a painstaking catalogue of details. In such case it is difficult to see what is gained by cutting up the part which deals with Australia and sandwiching it between other materials through some ninety pages of text. This is the more unfortunate since the economic geography—so important in Australia and New Zealand—is separated and comes some 240 pages later, receiving then but cursory and "statistical" treatment. Here, as in the work throughout, every effort has obviously been made to secure accurate and recent data, though much that is printed—including several of the maps—stands now in need of revision.

Despite these criticisms Dr. Geisler is to be congratulated on achieving a substantial and worthy advance towards a scientific treatment of the geography of the area. O. H. T. R.

POLAR REGIONS

THE ESKIMOS: their environment and folkways. By EDWARD MOFFAT WEYER. *New Haven: Yale University Press; London: Humphrey Milford* 1932. $9\frac{1}{2} \times 6$ *inches;* xviii + 492 *pages; diagrams and maps.* $5.00 (30*s*)

This is a book which gives a comprehensive description of the conditions under which Eskimos live in various parts of the Arctic and of the methods by which they have adjusted themselves to meet these conditions. The latter part is devoted chiefly to their private and spiritual life. The author shows how closely the habits of the widely divided communities are connected, but he confines himself to facts and avoids theorizing on the origin of the Eskimo people, their connection with geographically adjacent races, and their migration routes across the Arctic. The information is drawn from a careful search of anthropological literature supplemented by the author's own lively observation in the district of the Bering

Straits, where he has travelled. The result is a book of general reference divided up by numerous chapters and sub-headings and illustrated by a number of complicated diagrams, but written in a style which is never too heavy. Very often the reader finds paragraphs in smaller type or sentences in inverted commas where matter has been taken directly from other authors. These selections are duly acknowledged at the end of every chapter, and among the names mentioned Rasmussen, Stefansson, Thalbitzer, Jenness, and Birket-Smith are always to be found.

So much for the form and origin of the book, which is however remarkable because it bears the stamp of being written before too many years of study have destroyed the vivid memory of first impressions. It must not be presumed that it is therefore lacking in proportion, but it is refreshing to find that the small peculiarities of the Eskimo character which impress themselves upon the mind of a traveller are given due importance. The deep-rooted superstitions and complicated folk-lore of the Eskimo people may be powerful influences in their lives, but they do not impress themselves so much on a visitor who lacks a thorough knowledge of their language as their cheerful and practical view of life, their out-of-door dances and football games by the light of blubber lamp, the happy children with their "cats cradles," and the perfect communism of their family life.

The author has grasped the truth that the Eskimo has made himself comfortable in the north, hardly at all through his physical adaptation to cold, but almost entirely because of his ingenious mind. His well-covered frame and muscular strength are certainly assets to the Eskimo, but they would be useless gifts without the ability to turn a piece of driftwood and a walrus's tusk into a hunting instrument, and even the snow which makes him cold into a house to keep him warm. Handicapped physically with the swift fur-bearing animal of the north he is yet unquestionably their master even in those few remaining districts which are still unaffected by the appearance of white men and their weapons.

In the chapters devoted to spiritual beliefs it is made clear that though the heathen Eskimos observe many strange rites and taboos, these are remarkably harmless as compared with those of other primitive religions. In matters of life and death Eskimos are essentially practical; in times of famine they eat the dead and they kill those who are unfit to live, not as a sacrifice to an angry god, but because it is expedient both for the community and the sufferers. At worst such actions are a demonstration of courage in conviction which is unequalled in the most advanced community. These last chapters may however be confusing in their reference to the present-day Eskimo unless the expressed object of the book is borne in mind: to study the Eskimos' "adjustment in isolation to their original life conditions." Their reaction to the influence of white men has been left entirely alone.

Finally, the book is an excellent comprehensive work. It may be that the observations it contains are not sufficiently original to interest a specialist in Eskimo anthropology, but it gives to a future Arctic traveller the information he wants in an accessible form and one which will help him, since the acknowledgments and bibliography are so complete, to follow up any particular line of investigation with a minimum of delay. J. M. S.

PHYSICAL AND BIOLOGICAL GEOGRAPHY

THRILLS OF A NATURALIST'S QUEST. By RAYMOND L. DITMARS. *New York [and London]: The Macmillan Company* 1932. 9 × 5½ *inches;* xii + 268 *pages; illustrations.* 18*s*

Raymond Ditmars, a distinguished authority on reptiles, has brought together

some of his most exciting experiences during thirty years' close contact with wild animals. Snakes, as might be expected, come in for most attention. Accounts are given of strange adventures with rattlesnakes, bushmasters, pythons, and cobras. In some cases the animals are in captivity; in others encountered in the wild when the author is on hunting expeditions. For instance, we are told how to operate on the hamadryad's eye and how to photograph the spitting cobra without fear of being blinded by its deadly venom. The reader will learn many facts about the capture, transportation, and housing of wild animals. If he is interested in zoos he will find out what is rare and what is commonplace, and the prices that these institutions will pay for wild animals. It may be that to hear of 12,000 dollars for a pair of pygmy hippopotamuses will excite his cupidity in that direction. There is an interesting chapter on the ages of animals, and some remarks on the treatment of snake-bite, with regard to which there are two tendencies, each of which is in the wrong direction: one is to rely too much on ligature and incision and neglect the aid of serum; the other is to concentrate on serum and forget the value of local interference. Both forms of treatment have their value, and each is the complement of the other. R. W. G. H.

METAMORPHISM: a study of the transformations of rock-masses. By ALFRED HARKER. *London: Methuen* 1932. 9×5½ *inches;* x+360 *pages; illustrations.* 17*s* 6*d*

One of the most fascinating and at the same time one of the most difficult branches of geological inquiry is that concerned with the natural history of the metamorphic rocks. Time was when the study of a metamorphic rock meant listing its component minerals, but now an interpretation of the successive events in its history is attempted. When we reflect that the metamorphic petrologist is dealing with products that may have arisen from any rock whatever, that may have been subjected to any combination of temperature, pressure, or stress, and that may have been repeatedly so subjected, then we should not be surprised at the complexity of the subject. There is indeed a danger to the advance of the study of metamorphism in underestimating this complexity.

Dr. Harker's book is particularly welcome at this present time, for it gives us the results of his great experience in metamorphic petrography. Legitimate criticisms of the book are that its limits are narrow, that a great deal of very important foreign work is ignored, that the choice of illustrative material is almost wholly from British sources, and that chemical and mineralogical data are lacking. In the reviewer's opinion however these supposed defects are completely outweighed by other considerations. Within its limits, the discussion of the subject is masterly; British metamorphic material is, with few exceptions, unrivalled; while chemical and other data concerning the most important parts of metamorphic rocks, namely, the constituent minerals, are extremely meagre.

As the general method of presentation in this book, there are examined in order the changes produced in the various types of rocks—clayey, sandy, calcareous, and igneous—as they have been subjected in nature to varying conditions of pressure and temperature. In the first part, changes brought about mainly by increased temperature are considered; this is thermal or contact metamorphism, typically developed around an igneous intrusion. Especially valuable in this section is the description of the thermal metamorphism of igneous rocks, a branch of the subject hitherto given but scanty notice. In the second part of the book, regional metamorphism, due to the effects of pressure, in the main shearing stress, combined with temperature, is described. Normal regional metamorphism is held to have been produced under conditions in which shearing stress is constantly maintained at its maximum value with the changing temperature. Thus

stress is a function of temperature, so that the conditions controlling regional metamorphism depend upon a single variable. These principles are illustrated by the metamorphic zones of the Scottish Highlands. There are however great areas of metamorphic rocks produced under conditions of deficient shearing stress, as in Aberdeenshire and Banffshire, and these are fully discussed. A chapter is devoted to the description of regional metamorphism associated with plutonic intrusion, as in the injection-gneisses. Finally, cases of repeated metamorphism and retrograde metamorphism are examined. The place of detailed petrographical description is taken by drawings of over three hundred and fifty rock-slices.

This work, in spite of its limitations, is of first-class importance to all interested in the most widespread, and economically the most valuable, of the rock-groups of the globe. H. H. R.

PHYSICS OF THE EARTH—IV. THE AGE OF THE EARTH. (Bulletin of the National Research Council, No. 80.) By A. KNOPF and others. *Washington: National Academy of Sciences* 1931. $10 \times 6\frac{1}{2}$ *inches;* iv+488 *pages; diagrams*

This volume on the Age of the Earth, and more particularly on the application of methods based on radioactivity to this problem, is likely to disappoint those who expect to find that the age of the Earth, and of the various geological formations, can now be determined within narrow limits in terms of years. The volume fulfils however the purpose of this series, which is to give to the reader an idea of the present status of the subject "together with a forward looking summary of its outstanding problems."

The most satisfactory method is found by experience to be that which determines by chemical analysis the proportion of lead to uranium or thorium in certain minerals which are radioactive by reason of the transformations undergone by the latter elements in time. Each of them breaks down at a constant rate into a chain of products, and the end element in each case is lead. The rate of generation of lead from uranium or thorium has been elaborately investigated by physicists, and by assuming that the lead in a mineral has been derived wholly from one or other of these elements, it is possible to calculate the length of time that has elapsed since the mineral was formed. Lead derived from uranium or thorium respectively can be recognized by its atomic weight, and can be distinguished in the same way from common lead. In cases where lead of various origins occurs in a given mineral, the relative proportions can be found by an accurate determination of the atomic weight of the lead in the analysed sample.

The discussion of the results obtained by various methods of estimating the age of the Earth is preceded by an admirable summary by Adolph Knopf—the Chairman of the Subsidiary Committee on the Age of the Earth. It is sad to learn from this summary that out of the enormous numbers of accurate chemical analyses and of determinations of radioactive constants which have been carried out by chemists and physicists in various parts of the world, only seven satisfy the critical requirements for furnishing the age of the mineral in terms of years. One of them, the thorite from Brevik, Norway, is attributed to the Devonian or Carboniferous. Its age is given in millions of years as 324 or 310, according to which assumption is made as to the disintegration rate of thorium. There are however reasons for believing that the geological age of this mineral may be considerably younger than the Carboniferous. Another is a carbonaceous deposit called kolm, which is definitely known by fossil evidence to be of Upper Cambrian age. The age is given as 450 million years, but according to Holmes even this substance presents some unusual features, and its age may be actually greater

than the determinations indicate. It is stated however that elaborate work on this interesting deposit is now in progress. The remaining five are minerals from the pre-Cambrian of various parts of the world. One of these is a uraninite from South Dakota with an age of 1465 or 1462 million years. Some of the finest chemical work has been done on this mineral, but in regard to its geological occurrence it "is thought by Paige to be late pre-Cambrian, and by Wright and Hosted to be early pre-Cambrian, but the geological evidence for either of these positions within the pre-Cambrian is inconclusive."

A uraninite from Carelia, Russia, with an age of 1852 million years, is the most ancient yet found. Since it occurs in dikes which are intruded into still older rocks the age of the Earth must be considerably greater. It is believed that an upper limit of about 3000 million years may be assigned to the Earth as a separate entity. But, as the chairman remarks, "much of the work already done is only of suggestive value owing to the lack of correlation between the geologic, analytical, and atomic weight investigations."

In Part III of the volume Kovarik summarizes the conditions that must be satisfied in order to get a reasonably accurate age determination of a mineral. These are the analytical data, viz. the amount of uranium, thorium, and lead in a given mass of the mineral; the atomic weight of the lead from the *same* analysis; the disintegration constants of the radioactive elements involved; the atomic weights of the various lead isotopes separately; and the parental lineage of the various isotopes. Further, the possibility must be taken into account of the presence of common lead and of each one of the several lead isotopes in the mineral at the time of its formation. One might add moreover that the data of the geological age of the mineral should be investigated as fully as possible for each of the minerals investigated. It would be well if these requirements were suspended over the bed of each investigator in future, since neglect of one or other of them has in the past rendered of little value some excellent analytical and physical work.

Kovarik gives reasons for supposing that many of the specimens investigated already contained common lead at the time of their formation, and that consequently all the lead determined has not been derived from uranium or thorium since the mineral was formed. He develops formulae by means of which in future investigations this may be allowed for.

In Part IV the radioactive data are discussed at considerable length by Holmes; a valuable chapter is contributed on the radioactive minerals, of which an enormous number is already known. Another chapter deals with the geological relationships of the rocks from which the investigated minerals have been derived. In regard to many of these, geologists are not agreed as to the position in the geological sequence of the igneous rocks with which most radioactive minerals are associated. So long as that uncertainty remains there will always be uncertainty as to the value of the results obtained by radioactive methods. In cases where the determination of lead ratios appears to be contrary to geological facts it is sought to explain away the supposedly erroneous radioactive data either by leaching out of lead or by addition of lead.

The thorites from Southern Norway are discussed by Holmes. Since these minerals are associated with intrusive rocks believed to be of Devonian age, a lead ratio of 0·04 to 0·05 might be expected in order to bring them into accord with older and younger minerals. The actual ratios range from 0·002 to 0·038. It is concluded from this and other reasons that the minerals have suffered from leaching. If however the real age of the igneous rocks is much later than has been supposed the expectable ratio may not be very different from 0·03, which is near the value obtained in one of the best investigations.

It is clear that the time has not yet arrived when the lead ratios can be used with confidence in assigning the relative ages of various intrusive rocks where other evidence fails. Holmes, after considering the Scandinavian province, writes "in cases of this kind where the correlation of the pre-Cambrian is geologically ambiguous the determination of lead ratios becomes the only source of evidence by which the true position in the sequence can be fixed."

In Table LXXXII Holmes collects the lead ratios from a large number of minerals ranging in age from Tertiary to "Lower pre-Cambrian." They show generally an increasing ratio according to the geological age, but since there is not general agreement as to the geological ages of many of the minerals this table is open to suspicion. It certainly does not warrant, in the present state of knowledge, the construction of a provisional correlation-table (Table LXXXIII) of the pre-Cambrian rocks of the world.

Other chapters are devoted to estimates of the age of the Earth, namely on the basis of sediments and life by Schuchert, on the age of oceans by Knopf, the age from astronomical data by Brown. Each of these methods is so uncertain that no particular reliance can be placed on the results. Rather if the ages of certain geological periods were definitely known one would then be able to obtain useful information as to the rates of sedimentation or the rate of organic evolution in past times, which at present are mere guesswork. Holmes also discusses the pleochroic halo method and the helium method, and in both cases the uncertainties are so considerable that no reliance can be placed on the results.

It is to be hoped that the appearance of this volume will lead to closer co-operation among chemists, physicists, and geologists, and avoidance of the defects which have marred determinations in the past; and that a future volume will produce really reliable data. It is clear that the radioactive method holds the field as the most successful which has yet been attempted. If active co-operation between various research workers can be secured, and a stringent choice is made of materials to work upon, more concordant data will be obtained than has been the case hitherto. O. T. J.

PLANT ECOLOGY, for the student of British vegetation. By WILLIAM LEACH. (Monographs on Biological Subjects. General Editor: G. R. DE BEER.) *London: Methuen & Co.* 1933. 7×4 *inches;* viii+104 *pages; illustrations.* 3*s* 6*d*

Ecology—the study of plant and animal communities—is rather a point of view than a separate science, but this does not detract from its growing importance in the sciences of botany and zoology. Plant ecology has sprung, as the author of this book points out, from field botany, and in its development must inevitably advance more and more into the domain of plant physiology. The fundamental reasons that determine why some plants can thrive in conditions and company that others cannot tolerate are physiological reasons. Problems of variability and competitive success underlie the distributions that we see around us. In short, it is hardly too much to say that we do not begin to know a plant as a living organism until we have examined its relationships both with its physical surroundings and with the other organisms among which it lives. In broad outline these relationships are of importance to the geographer, for the vegetation carpet may modify considerably the surface features of the Earth.

Within the ninety-seven pages of this handy little book the author attempts a general sketch of the principles of plant ecology; that he does not altogether succeed is hardly surprising. Many technical terms are necessary and most of them are clearly defined, but the book does not make easy reading. The style is uneven and occasionally breaks into that of a pure text-book. Designedly, and

properly, the author devotes considerable space to the discussion of soil problems, but in so doing goes into details that could well have been omitted from a book of this size, and raises difficulties that there is no space to elucidate. Apart from this, the book contains much useful information and should prove valuable to the student, for whom it is intended. C. D.

ECONOMIC AND HISTORICAL GEOGRAPHY

THE EUROPEAN NATIONS IN THE WEST INDIES, 1493–1688. By ARTHUR PERCIVAL NEWTON. (The Pioneer Histories. Edited by V. T. HARLOW and J. A. WILLIAMSON.) *London: A. and C. Black* 1933. 9 × 5½ *inches;* xviii + 356 *pages; sketch-maps.* 15*s*

The reader who turns first to the map at the end of this book, the West Indies about 1680, will see, set out pictorially, the story which the book unfolds: the lands of the Caribbean Sea in European occupation—the big land masses, the coasts, and the larger islands, for the most part in the hands of Spain, but the joints of the Spanish possession pierced by the lodgment of other European nations at points on the mainland of Central America, in Jamaica and western Hispaniola, and in the Leeward Islands and other small groups. The Windward Islands still lie unoccupied, and the Mosquito Coast, but otherwise Europe has taken firm hold of this island sea.

That the West Indies should be the first scene of European colonization in the New World was the natural result of the course of Spanish discovery, and that they should be, in part, abandoned by the Spaniards in favour of the greater opportunities of the mainland and fall in turn to the new nations pressing in to share the prizes of maritime discovery followed in the natural sequence of events. But that they should have held for centuries a position of the greatest international importance requires the explanation of history as well as of geography. "From the middle of the sixteenth to the end of the eighteenth century," writes Professor Newton, in his admirable introduction, "the Caribbean was the cockpit of international maritime rivalry, and for long the lands around it were thought of as the greatest treasure house in the world. But even after such dreams were exploded . . . the islands played a part of almost undue importance in world strategy." The reasons for this are set out in the story which follows of Spanish exploration and Spanish colonies, of French corsairs in the Caribbean, followed by Dutch and English contraband traders and privateers and by the organized attacks on Spanish possessions there, begun by Drake in 1584, which established in the mind of England the idea that in the West Indies was the vulnerable heel of Spain's great empire. When the Treaty of London was signed in 1604, though Spain made no apparent concessions, it was clear that she could not keep out of the vacant spaces of the New World those who were now determined to get in. The principle had been established, though not admitted by Spain, that effective occupation could alone give a right to territory beyond the sea. Thus the Treaty of London was soon followed by the first settlements of English and French in the Lesser Antilles. Circumstances in Europe were changing at the time. From 1625 France, in the strong hands of Richelieu, was the determined foe of the Spanish Monarchy, and the West Indies could no longer be protected. English, French, and Dutch settlers poured in; they had realized that a profit could be won from plantations no less than from forcing trade with Spanish colonies. After the middle of the century the incoming nations, though all against Spain, were now also competing with each other for trade and colonies: first, English and French against Dutch, until the Treaties of Breda in 1667 settled the

distribution of the sugar islands among the three Powers on lines that held good till the middle of the eighteenth century and freed their hands to compete for the trade of the Spanish Indies. At the same time there gradually appeared the Anglo-French rivalry which from 1689 was to become the dominant factor in West Indian history.

Of all these matters Professor Newton has given an admirable account. With great skill he guides the student through the unfamiliar maze of international struggles in the Caribbean Sea, bringing into prominence the significant events and keeping clear the connection between European politics and the local scene. The book is of much interest and value, presenting the latest results of scholarship in a form acceptable to the general reader. E. A. B.

DOCUMENTS CONCERNING ENGLISH VOYAGES TO THE Spanish Main, 1569–1580. I. Spanish Documents. II. English Accounts. Edited by I. A. WRIGHT. (Works issued by the Hakluyt Society. Second Series. No. LXXI issued for 1932.) *London: The Hakluyt Society* 1932. 9 × 5½ *inches;* lxiv + 348 *pages; portrait and maps*

Miss Wright's volume contains matter that would be after Hakluyt's own heart: seventy-three Spanish documents, hitherto unpublished, translated into English; the text of 'Sir Francis Drake Revived,' reprinted for the first time from the edition of 1628; and some relevant extracts from Hakluyt and the 'Observations' of Sir Richard Hawkins; all preceded by an illuminating Introduction from Miss Wright herself.

The reader may be recommended to begin with 'Sir Francis Drake Revived.' It tells in connected form the story of the 1572–73 expedition, which may then be traced from the Spanish point of view in the Seville documents discovered by the editor. That story of adventure and escape, of continued ill-luck turning at last to a dazzling success, has been described by some critics as incredible. It is now confirmed in all essentials by the Spanish dispatches written by officials on the spot, first-class testimony by eye-witnesses who had none of the later historians' bias for or against Drake. They wrote of what they knew, and some of them did not even know the name of the corsair whose deeds they were describing; but their details coincide, sometimes exactly, with those embodied in the English narrative.

The early documents do more than prove Drake's story. They furnish a vivid picture of the Spanish settlements on the Main and the coast of Central America, throwing light on the trade, shipping, administration, and mode of life of the colonies. The nautical archaeologist will perhaps find new light on the vessels used on the coast. The student of administration will observe the working of the ponderous Spanish mechanism, destined ultimately to be broken down by its own friction.

The later documents deal with Andrew Barker and John Oxenham. About Oxenham, in particular, they are very important. Little has hitherto been known of him except for an untrustworthy report drawn by Hakluyt from foreign sources, and some equally untrustworthy details recounted by Sir Richard Hawkins. The date of his expedition has always been given as 1575, on the authority of Hakluyt's informant. It now appears that he sailed in 1576 and was captured in 1577. His personality made a great impression on his foes. He may have been the swashbuckler of Kingsley's imagination, but if so, he was also an extreme and fanatical Puritan, who made captive priests shudder at his blasphemies even though they suffered no more physical damage than a little schoolboy horseplay could inflict. There is one passage of that sort over which the reader will chuckle. Oxenham's expedition was a much more serious business

than has been supposed. His invasion of the Isthmus caused a panic, threatened to shake the hold of Spain upon her colonies, and called forth the best troops of the two viceroyalties before it was overcome. J. A. W.

HISTORY, PSYCHOLOGY AND CULTURE. By ALEXANDER GOLDENWEISER, Professor of Thought and Culture, University of Oregon. *London: Kegan Paul, Trench, Trubner & Co.* 1933. $9\frac{1}{2} \times 6$ *inches;* xii+476+xii *pages.* 18*s*

Professor Goldenweiser is proclaimed by his publishers as one of the leading American anthropologists. It is therefore informative to extract some of the theories embedded in this discursive volume. He regards the historical process as a combination of the accidental and the deterministic. He replaces the physical environment as an influence in man's development by culture—for he argues that environment is static, and culture is dynamic. A great individual is the product of his time and culture—though he recreates individually what he receives from them. The writer of course admits that culture ultimately derives from the work of men, but considers that for practical purposes it may be assumed to be an independent factor. Although he assigns so important a role to culture, he seems to consider one civilization as good as another: a significant standpoint for an American. He regards mankind as a unit, and looks forward to the discovery of a psychological equivalent of race. G. R. C.

HISTORIA DE LA COLONIZACION. By G. DE REPARAZ. Volume I. (Colección Labor.) *Barcelona: Biblioteca de Iniciación Cultural* 1933. $7\frac{1}{2} \times 5$ *inches;* 468+xvi *pages; illustrations and maps*

In this small volume the author, interpreting colonization widely, gives a sketch beginning in Ancient Egypt and ending in British India. Its main interest for English readers will probably lie in its presentation of the Spanish point of view, particularly on the New World. He shows the divergence of outlook between Aragon—Catalonia, drawn to the Mediterranean, and Castile, seeking with Genoese assistance, a western empire. The Castilians he considers unsuited for colonists, and he discusses frankly their treatment of the Indians. There are some interesting details of the Spanish emigrants to the New World in the first century of their rule, who numbered eight thousand only, and of the taxation. Merchandise for Spain seems to have paid imposts amounting at least to 75 per cent. of its value. The author is naturally not quite so much at home when dealing with other countries. In a second volume the author will treat of modern problems of colonization. The book is well produced. G. R. C.

GENERAL

WINDWARD HO: Windjammer Days. By A. W. PEARSE. *Sydney, Australia: John Andrew & Co.* 1932. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 186 *pages; illustrations.* 5*s*

This slight book is a medley of maritime recollections and memories. The first chapters give a vivid picture of the life of an apprentice of ability and ambition in the good old days of windjammers; and the description of those times is illustrated by a number of drawings of well-known ships. Incidents in the lives of the captains of these ships make very interesting reading, and the tale of Captain Woodward and how he bluffed the American Admiral at Colon is a good example of the resource and determination of these sea-autocrats. So much for the first half of the book; but on p. 93 the author left the sea as a profession and in 1891 we find him starting the *Pastoral Review* to combat the revolutionary strike in Queensland. A very interesting description of "New Australia," a Socialistic Utopia, is then given, one of those experiments the failure of which is sometimes

conveniently forgotten. The rest of the book consists of random experiences and journeys in the Argentine, South Africa, China, Japan, and Egypt, and finally the author finds himself the appointed representative in Australia and New Zealand for the Port of London Authority and a recognized authority on the meat-freezing trade. In an autobiography such as this we must forgive a certain amount of natural self-satisfaction, and congratulate Captain Pearse on the success of his enterprise and enthusiasm. H. M. E.

GENERAL WILLIAM EATON: the Failure of an Idea. By FRANCIS RENNELL RODD. *London: George Routledge & Sons* 1933. $8\frac{1}{2} \times 6$ *inches;* xii + 314 *pages; illustrations and maps.* 12*s* 6*d*

William Eaton, the son of a Connecticut farmer, saw service as a youth in the War of Independence; tried schoolmastering and local politics; served as a captain in the Army against the Indians; was employed by the Secretary of State on a couple of confidential missions, and at the age of thirty-three was appointed in 1797 American Consular Agent at Tunis on the Barbary coast. The pirate States of this coast—Morocco, Algiers, Tunis, and Tripoli—were already giving trouble to ships carrying the new American flag, and Eaton, who only arrived at his post in March 1799, encountered immediate difficulties in carrying out a revision of the treaty which then governed the relations between the United States of America and Tunis. This revision he was compelled, against the grain, to secure ingloriously by paying for it. His thoughts were already in 1801 turning to diplomacy backed by force instead of by payment, and he adopted the suggestion of his colleague in Tripoli that pressure should be brought to bear on the troublesome ruler of that place, Yusuf, by encouraging the claims to it of his dispossessed elder brother, Hamet. The idea was generally approved by the American authorities, but Eaton, now transferred to Tripoli, found himself unable to secure effective support to his plan by the American Naval Squadron which, first under one and then another somewhat feeble commander, allowed 1802 and the first part of 1803 to pass without taking any effective measures either to bring Yusuf to reason or to replace him. In the middle of the latter year, with Commodore Preble in command, a new forward policy was adopted, and at the end of it Eaton was appointed Navy Agent of the United States of America on the Barbary coast and promised money and weapons to advance his plan of substituting Hamet for Yusuf. Then a fresh factor in the situation arose from the capture by a Tripolitan vessel of an American warship which had run aground in pursuit of her and left three hundred sailors as hostages in Yusuf's hands. Eaton was in America when the news of this disaster arrived; its effect was to stimulate schemes of naval action rather than to promote his special plan, and this was further imperilled by the appointment of a Consul-General to Algiers who proved to be unfavourable to it. By the middle of 1804, before the naval reinforcements had reached the Mediterranean, Preble had fought a gallant and successful engagement with the forts and ships of Tripoli. Back in the Mediterranean, Eaton wrote a vivid account of the campaign. With another change of command naval operations became less intensive, but the new Commodore agreed with Eaton that aggressive naval action against Tripoli should now support Hamet in an offensive move and thereby secure the release of the American prisoners and the making of a satisfactory treaty of peace. Hamet was then in Egypt, and thither went Eaton in November 1804 to entrust him with the role of leading the land offensive. After some difficulty, owing mainly to the disturbed state of the country, Eaton succeeded in getting into touch with Hamet at Burg-el Arab, some miles west of Alexandria. The scheme to take Hamet and a few followers on shipboard to Derna, the second town of Tripoli, as a signal for

a rising of Cyrenaica against Yusuf, was found to be impracticable, and Eaton then decided to invade Tripolitania overland. On 4 March 1805 he signed a convention with Hamet in which the latter entered into various engagements to take effect when he should be placed on the throne and by which General William Eaton was appointed to be Commander-in-Chief of the expedition to effect this restoration. The force consisted of some six hundred men "held together by the cohesive power of public plunder," and included nine Americans and forty Greeks. The march through the desert began on the 8th of the month, and the journey of some 460 miles as far as Bomba, where the expedition was to get into touch with its naval supports, was accomplished after overcoming great difficulties by April 15. It was resumed on the 23rd, and three days later Derna was captured. Counter attack followed, and the town was held against a strong but weakening force of Arabs till June 12, when Eaton, by order of the Consul-General at Algiers, evacuated the place. The order was the result of a peace made with Yusuf on the old basis of buying him off—in this case by payment for the release of his captives. Some three years later a Committee of Congress considered that the plan to enthrone Hamet had been unreasonably abandoned. Eaton returned to the United States in November 1805. Apart from his attempts to get some measure of justice for those who had supported him in the idea that had failed, there is little in the remaining six years of his life that can be recorded with any sympathy.

The author represents his hero as forcible, ambitious, patriotic, somewhat vain, and not over scrupulous. The book is eminently readable, and in the account of the central incident—the march to Derna, its capture and defence—certainly thrilling. The relation of what occurred after that is evidently an uncongenial task, and the last chapter is unnecessarily prolonged by the insertion of a poetical but unconvincing general theory of the author and of a poem, not his own, which he admits to be far away from its theme. Here and there in the volume occur passages difficult to understand, and there are one or two that, owing to careless proof-reading, are scarcely grammatical. M. N.

SOUTHERN CROSS TO POLE STAR. Tschiffely's Ride: being the account of 10,000 miles in the saddle through the Americas from Argentina to Washington. By A. F. TSCHIFFELY. *London: William Heinemann* 1933. 9×5½ *inches;* xxii+442 *pages; illustrations and sketch-maps.* 15*s*

It is a common criticism of the profession of teaching that those who follow it are apt to get into a rut. One is not surprised that Mr. Tschiffely felt this after nine years at an Argentine school, but one is impressed by his thorough method of dealing with the danger. With two old horses and nothing more than his saddle-bags would hold he rode north and then north-westward from the plains of the Argentine over the Andes, past La Paz, the Hidden City, to Lima and the romantic Inca country. He found much to interest him, but he allowed nothing to detain him long, for he had some 10,000 miles to go and was always in a hurry. North of Lima there were desert and more mountains to cross by trails that were bad or non-existent. It would appear that the maps were little more helpful than the directions of the Indians who, when asked the way, pointed vaguely with the words "straight on."

From Cartagena Tschiffely, his horses, and the half-breed boy he had picked up, travelled by steamer to Panama, where he stayed over Christmas. Entering North America he encountered new difficulties in the form of forests and tropical heat alternating with the high mountain passes. In Mexico there were bandits as well as hospitality, but once in Texas his difficulties were virtually over. Tschiffely reached Washington after a ride which lasted for more than two years.

This is the story of a wonderful achievement. His chief object, Tschiffely says, was to demonstrate the staying power of the Creole horse. There can be no doubt of his success in this, but for the general reader who is less interested in horses than in human beings there are included many tales of strange people, stories of cruelty or kindness which are told, as the main story is told, in a personal and almost conversational style for which the author feels bound, quite without reason, to apologize. J. M. S.

RECENT HEROES OF MODERN ADVENTURE. By T. C. BRIDGES and H. HESSELL TILTMAN. *London: George G. Harrap & Co.* 1932. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches; 284 pages; illustrations. 7s 6d*

No doubt first impressions are less valuable than considered judgments, but one is bound to feel prejudiced against a book whose frontispiece is headed "The Frozen Outposts of the Infinite. One of the climbers of the Fourth Kanchenjunga Expedition on the famous Summit Ridge 21,000 feet above sea-level," when actually the picture shows the summit of Mount Kamet. Yet the book fulfils its object, which is to be an anthology of modern adventure and exploration, a brief précis of the records of nineteen travellers who have all done something more or less out of the ordinary. One finds such chapter headings as "Across the Great Freeze," "Walking from Cape to Cairo," and "The Bishop who ate his Boots," among which "An Adventurer with no Adventure," who turns out to be Major Hingston, is a pleasant relief. The selection is intentionally catholic, but many will wish that in the description achievements had not been subordinated to hardships, for to a good traveller adventure is synonymous with inadequate organization. The pages are full of struggles against cold or insect pests, hunger, thirst, and weariness which leave little room for more subtle description, and tend to make the book monotonous considered as a whole. J. M. S.

THE HOME OF MANKIND. By HENDRIK WILLEM VAN LOON. *London: George G. Harrap* 1933. 9×6 *inches; 506 pages; illustrations and sketch-maps. 12s 6d*

THE GEOGRAPHIC FACTOR: its role in life and civilization. By RAY H. WHITBECK and OLIVE J. THOMAS. (The Century Earth Science Series. Editor: KIRTLEY F. MATHER.) *New York; London: The Century Co.* [*D. Appleton & Co.*] 1932. 8×5 *inches;* xvi + 422 *pages; maps. 10s 6d*

That journalists have long since snatched history from the historians is a familiar fact: they are now finding it worth their while to snatch geography from the geographers. Mr. van Loon's World History, 'The Story of Mankind,' published in 1921, had an enormous success. His World Geography, 'The Home of Mankind,' the book under review, will doubtless prove as popular: in it he "explores the cracked and wrinkled face of the earth in relation to man as a human being." Mr. van Loon has a keen eye, an agile mind, and a facile pen: having skimmed the latest encyclopaedias, year books, and texts, he is soon sufficiently informed as to the main facts of geography, and proceeds to "put them across" in characteristic vigorous American style. It would be easy to demonstrate that the book teems with errors. The sketch entitled "If the English Channel should run dry," for example, shows a chasm some 50 or 60 miles deep, instead of the wide shallow vale of reality, and it is easy to believe the author's confession that "I wrote this book with the help of a ten-cent store globe which was really a pencil sharpener." Over-statements, too, are numerous and perhaps more dangerous than errors, as, for example, that the Romans "in less than five generations completely changed the climate of their own peninsula," and that Vienna "is slowly disintegrating into a dead city where disheartened old

men and women wander aimlessly among the ruins of their former glory." But the book is not intended for the pedantic! Mr. van Loon can think geographically, he can bring home the value of sketches and sketch-maps, he can pick out essentials (witness his map of Kiev and Novgorod on the old Baltic–Black Sea water route), and furthermore, as his earlier work shows, he can express facts in a form that is seized upon with delight by adolescent and immature minds. Tens of thousands of young people learnt from him that history was not just "lessons," but a world drama of tremendous import to themselves, and tens of thousands will presently transfer geography from the category of "lessons" to that of realities. There is a growing belief among educationists that the present school curriculum which would make a "scholar" in the academic sense of each pupil is unsound. Scholars must specialize, they must eschew generalizations, wide views and daring speculations, they must not go an inch "beyond the facts." Yet wide views, general ideas, and all-embracing theories alone are exciting and stimulating, and it is far more important that the average adolescent should be alive to and aware of the interplay of geography and history than that he should know exactly the foreign policy of Henry VIII or the regime of Indian rainfall. The appetite once whetted by Mr. van Loon, a proportion at least will turn to the more orthodox literature of the subject, and the rest will at least know that geography matters.

'The Geographic Factor,' in its scope and purpose, is somewhat akin to 'The Home of Mankind,' for it aims at implanting general notions. It was written at the instance of a Professor who "was organizing and administering an orientation course in the social studies, and wished to include a consideration of the geographic factor as one of the factors which influence the development of life and culture." The authors suggest that it a symposium, but to the reviewer it appears rather as a "crazy patchwork," for it is in the main built up from quotations, some lengthy, some brief, from as miscellaneous a collection of authors as could be imagined. "The Bases of Myths," for example, is allotted seventeen lines, in which the reader is bombarded in quick succession with quotations from Tylor, Andrew Lang, Max Müller, Bossuet, and Sir James Frazer. Now the unspecialized student for whom the book is written may have heard of some of these notable men, but he is quite unable to discriminate between their status as authorities on the matter in question. The authors indeed fall into the common and extremely dangerous error of suggesting that because a writer has earned a reputation in a particular scientific field, his opinion on matters quite outside it is therefore valuable. The eminent geologists, Chamberlin and Salisbury, are quoted at length on the shifts of Ancient Empire: the value of the quotation is exactly *nil*, but the young student, dazzled by these well-known names, will be impressed. The method of quotation was, in the opinion of the reviewer, unwisely selected from another standpoint, that of space. An enormous field had to be covered ("Man's Adjustment to Plains," for example, is allotted sixteen pages), and quite apart from the readers' lack of critical capacity, a succinct and balanced exposition from an individual standpoint, such as Professor Whitbeck is well qualified to produce, coupled with the ample bibliographies already provided, would have made a more valuable book. The great care that the writers have taken to avoid the pitfalls of "geographical determinism" is largely nullified by the false impressions necessarily given by over-condensed statements, and by the citation of two or three particular instances which may have no general validity. The task undertaken was however a difficult one, and the book will undoubtedly interest and stimulate the reader to whom geographical notions are new.

E. G. R. T.

THE MONTHLY RECORD

THE "JOHN MURRAY" EXPEDITION TO THE INDIAN OCEAN

The Arabian Sea has long been crying out for investigation by geographers. It is bounded to the west and north by Africa and Arabia, most of this an area of scanty rainfall and land drainage. Here it is influenced by the Gulf of Aden with the Red Sea, a basin of over 1000 fathoms of depth but with a shallow sill to the south of less than 100 fathoms, and the Gulf of 'Oman, into which opens the shallow Persian sea, with the great drainage carried by the Tigris and Euphrates. To the north-east lies the coast of India, but the continental shelf here differs markedly from that off Africa and Arabia in being of great breadth. It is complicated by shallower banks and islets off the southern part of the peninsula, whence a broad ridge runs to lat. 1° S., marked by the Laccadive and Maldive groups. These are mostly separate coral structures to the north, replaced in the Maldives by large atolls, a marked feature of the central region of the same being a double line of ring-shaped reefs with islets about 25 miles apart. A bight of water with depths up to 1550 fathoms extends between this ridge and South India, the Laccadive sea. About 200 miles farther south from the Maldives lie the Chagos group of five atolls and banks, Great Chagos being about 90 miles in diameter, while the traverse to the banks lying off the Seychelles is 540 miles. These banks rise upon a ridge extending north from the volcanic islands of Mauritius and Réunion, and are mostly submerged and of large size. The plateau ridge bends south at the granitic Seychelles, and in this part series of coral islands are visible to 120 miles of Madagascar, a channel between of 1818 fathoms. The distance of this ridge from the African coast to the north-west is about 600 miles, in reality a great bight of the Arabian Sea. It has a general depth of over 2500 fathoms, but its southern connection at the north end of the Mozambique channel does not exceed 1100 fathoms.

The Arabian Sea, as thus delimited, is completely devoid of land and of shallow banks, but soundings are so few and far apart in its central region that this is one of the least known of oceanic areas. General depths of 2000 to 2500 fathoms are found in the Arabian Sea with occasional soundings, especially to the south-west, up to 2930 fathoms. A few depths suggest that irregularities of some magnitude may occur, and these are most marked to the north. Here there seem to be indications of a possible submarine continuation of the mountains of Eastern Arabia in a south-westerly arc, and again of the Hala mountains in north-west India to the south-west and west as far as the meridian off the entrance of the Persian Gulf. If the latter be so, there is a deep valley between this continuation and the Mekran coast. Furthermore, the late Dr. Schmidt suggested that there may be a submarine ridge connecting the Chagos with Arabia and the Gulf of Aden. All geographers agree that India was once joined to Africa as a part of the Gondwana continent. The mechanism by which separation has been effected was, according to the older school of thought, by the foundering of the land which once lay between. The newer school suggest that there has been a drifting apart of the Indian peninsula from the African continent without the intervention of any substantial amount of land that has since sunk.

The surface waters of the Arabian Sea have been investigated by Matthews, but, as he points out, we know almost nothing of the whole water circulation. The northern part to lat. 10° N. is an area of high salinity, over 36 per mille. The next belt to the south, viz. 35·5 per mille, cuts through north of Guardafui and Socotra to the Arabian coast separating the high saline area of the Red Sea and

Aden Gulf and of the North Arabian Sea. This Socotran region, both north and south, is noted for its strong and varying currents and terribly confused seas, especially in the south-west monsoon, and clearly is an area of vertical water movements. The subsurface circulation of the Bay of Bengal has been investigated by Sewell, who for the Arabian Sea suggests an Antarctic bottom drift at depths of 1500 fathoms and over, a tropic intermediate layer moving roughly from north to south at about half this depth, and a polar intermediate layer at about 250 fathoms. Sewell himself however deprecates all such theorizing, requiring analysible samples. In any case, knowledge is desired as to the depths of all water channels into the Arabian Sea, and these depths are still very uncertain. To the east, the channels north and south of Minicoy (Eight and Nine Degree) have about 1000 fathoms, and there are depths of 231 to 1118 fathoms between the various Maldivan atolls. A ridge might naturally be supposed to connect the latter to the Chagos, but the *Sealark* in 1905 failed to find any evidence of such rising above 2000 fathoms. The least possible depth for a ridge between the Chagos and the Seychelles ridge is 1838 fathoms, and from the latter to the African coast over 2500 fathoms.

The trustees of the late Sir John Murray have chosen this area for an expedition commemorative of that great oceanographer. They possess the means, for Sir John himself left funds to be expended by them on the lines of research in which he himself was interested. That the area is one which would meet with his approval is certain, for he often expressed to the writer, when preparing for and considering the results of the *Sealark*, his regret that the *Challenger* omitted this region and his hope that it would some day be properly investigated by the Indian marine as originally arranged, or by some British expedition. It is an area chosen by the trustees of Sir John Murray after consultation with most of those active in oceanographical research to-day, and the funds and all arrangements have been placed by them in the unfettered control of a Committee which it is hoped may be regarded as representative of oceanography, viz. Mr. J. C. Murray (Chairman), Admiral Sir Percy Douglas, Captain Edgell, Professor G. I. Taylor, Drs. C. Tate Regan, S. Kemp, E. J. Allen, W. T. Calman, and Professor Stanley Gardiner (Secretary).

The general plan of the expedition was that suggested by Colonel Seymour Sewell, I.M.S., SC.D., who, previous to his present post as Director of the Zoological Survey of India, had been on many voyages as Surgeon Naturalist on the *Investigator*. He is to lead the present expedition and he will be accompanied by Captain MacKenzie, formerly of the *Discovery*, Lieut.-Commander Farquharson (seconded by the Admiralty), and six biologists, three on the physical and three on the zoological side. For the purpose of the expedition the Egyptian Government has lent their research and fishery trawler, the *Mabahiss*, 140 feet long, built in 1929. Certain alterations are to be made in the fish-hold so as to enable more coal to be carried and more accommodation to be provided for the scientific party and stores. For this purpose the *Mabahiss* goes into dock at Alexandria in July, when she will also be fitted with sonic sounding of the Admiralty-Hughes pattern. Otherwise the *Mabahiss* is well suited for the expedition, having 3500 fathoms of trawling warp and trawling gallows; she will also be fitted with hydrographic warp for water sampling, etc., of the same length. Two of the scientific party will be research students of Cairo University, while the watch officers and crew will be Egyptian.

The present plan is for the *Mabahiss* to leave Alexandria on September 1, first setting a straight course to Hamish island, situated on the shallow sill of the Red Sea. A number of traverses of the Arabian Sea will be made at varying distances south of Arabia and roughly parallel to the line of this coast. On each traverse

the bottom section should be obtained by sonic gear, while some wire soundings will be taken so as to determine the deposits. The latter are of interest, especially the blue mud off South Arabia, which can be only relatively little influenced by land drainage, and the green sand (glauconite), which occurs in places from 50 to 1000 fathoms, and the present formation of which in relation to depth is most uncertain. Stations will also be established at distances of 200 or more miles apart, at which water samples and temperatures will be obtained from the surface to the bottom. As the *Mabahiss* will be fitted with a chemical laboratory, and as rapid methods have been developed for the analyses of some of the constituents of sea-water critical to the quantity of animal life contained therein, most of the necessary chemical analyses will be carried out on board, the weather in the south-west monsoon not usually being too rough for such work. Such analyses should also help in the differentiation of the various water layers. It is part of the plan to make special topographical as well as water sections off the south coast of Arabia, and Murray's "mud line" may well prove of great importance here. The exploration of the Maldive ridge by sonic sounding should be interesting, while a proposed series of pendulum observations to be taken by Major Glennie, of the Indian Survey, across two of the surface atolls of the Maldives, these having a trough of 600 fathoms between, may well give some indication of the depth and specific gravity of the rock underlying the coral formations.

The biological work of the Murray Expedition will be running continuously during the whole expedition so far as other observations allow, but special concentrations of trawling and dredging for the bottom fauna will be made in the Gulfs of Aden and 'Oman and off the East African coast. It is possible that there are considerable differences between the deeper fauna of these three areas, though at times surface currents, carrying eggs and larvae, may make their shallow fauna closely similar. The Gulf of Aden should feel the influence of the high temperature and salinity of the Red Sea, while the Gulf of 'Oman has no such character, but may prove peculiarly rich, owing to salts, necessary to animal life, being carried into it with the much more abundant land drainage. The northern areas too are almost devoid of coral reefs, whereas long stretches of East Africa are protected by the same. It is hoped to obtain information as to the zonal (depth) distribution of the bottom fauna, and the use of grabs should also prove of great value as indicating how far it is desirable to attempt quantitative results on future expeditions.

The above plans of Colonel Sewell can only be regarded as very roughly laid, for the provision of echo sounding is bound to have a profound effect on the plans of all future deep-sea research expeditions, giving their leaders immediate information, previously never available, and enabling them to follow up topographical anomalies never suspected. The first sonic section to be obtained will be that down the centre of the Red Sea, an area already relatively well sounded but now to be accurately delineated. On this section will undoubtedly be largely based the plans for an Egyptian Red Sea expedition, proposed also to be run in the *Mabahiss* in 1934–35. Preparations are already being made for this expedition by the University of Cairo, and the same gear and methods will be employed both on the British and Egyptian expeditions, so that all results will be strictly comparable. The University of Cairo is arranging to analyse water samples to be taken on certain routes of the P. and O., the Orient, and British India Lines, for the Murray Expedition, and probably all the detailed examinations of nitrogen, oxygen, phosphates, silicates, nitrogen compounds, etc., of the Red Sea expedition will be made there. The University has its marine station at Ghardaqa (near the mouth of the Gulf of Suez) with deep water in its vicinity, and here

biological and other discoveries may be experimentally investigated. The deep waters of the Red Sea are quite unknown, and the Egyptian expedition should therefore be of high scientific and perhaps practical interest. It is conceivable that in deeper areas of the Red Sea there may be no bottom fauna, in which case new factors will require consideration in its zoning. It is possible that the absymal fauna may be there but driven up to shallower depths owing to the chemical conditions of the deeper waters. The floating fauna (plankton) should be of great interest in the Red Sea, whereas it is not to be seriously collected quantitatively in the Indian Ocean. All geographers and all scientific men will, we feel sure, join in welcoming such an Egyptian expedition and in wishing it every success. J. S. G.

THE IRISH FAUNA AND FLORA

A paper by Dr. R. Lloyd Praeger entitled "Recent Views bearing on the Problem of the Irish Flora and Fauna," published in *Proc. Roy. Irish Acad.*, vol. xli, sect. B, no. 8, lays stress on the barriers against the immigration of plants and animals presented by water and on the difficulty of accounting for the origin of the Irish species unless the instability of the Earth's crust, resulting in considerable changes in the relative level of land and sea and position of coast-lines, is borne in mind. Having studied the question for a great many years and weighing all the evidence available, Dr. Praeger finds himself now, as formerly, a supporter of the main views of Edward Forbes enunciated nearly a hundred years ago. The plants and animals of Ireland were not evolved within the island, and much of the present flora and fauna arrived by land routes from the Continent and Britain during inter-glacial or post-glacial times. There are two elements however, the American and Lusitanian, which are considered to have reached Ireland in pre-glacial times and to have survived the main glaciation. These oldest elements in the flora and fauna migrated northward along the western European coast-line, or eastward from America when the intervening barriers of sea were much less formidable than they are at present.

Dr. Praeger is at pains to show that even during the maximum extent of the ice-sheet in Ireland there were ice-free areas where species could have survived, and compares Ireland at that period with Greenland to-day. Ostenfeld considers that some 60 of the 390 species of flowering plants now found in Greenland inhabited that country at the time of the maximum glaciation, and has shown that a considerable proportion of the present-day assemblage of species has a range beyond the Arctic region. Hence there is no need to demand total, or nearly total, extinction of flora in glacial Ireland with its more southerly position, warmer surrounding seas, and much more powerful sunshine. Indeed the plight of the Irish flora under an ice-sheet would appear to have been much more favourable than that of the Greenland flora even to-day.

ATMOSPHERIC CIRCULATION OVER TROPICAL AFRICA

In "A Study of the Atmospheric Circulation over Tropical Africa," constituting *Geophys. Mem.* of the Meteorological Office, no. 55, Dr. C. E. P. Brooks and Mr. S. T. A. Mirrlees present a more detailed picture of the distribution of pressure and wind than is to be found in the ordinary text-books. The study consists essentially of maps with explanatory text showing on the basis of seventy-seven stations, for the months of January, April, July, and October, the distribution of pressure both at sea-level and 1000 metres, the chief air-currents, and the average rainfall over nearly the whole continent. The prevailing winds in Africa dispose themselves in five main air-streams which are referred to as (1) the Atlantic N.E. trade, including the Harmattan; (2) the Egyptian stream,

likewise part of the N.E. trade system; (3) the Arabian Sea N.E. trade; (4) the Indian Ocean S.E. trade; and (5) the Atlantic S.E. trade and the S.W. monsoon, a deflection of the Atlantic S.E. trade. Perhaps the most striking feature brought out is the definite relation of the distribution of rainfall to the areas where two or more of the stream-lines converge, or to lines of separation between two currents such as the humid S.W. monsoon and the dry Harmattan. Thus over the Abyssinian highlands where the rainfall in July is moderately heavy, about 10 inches, there is seen to be a marked concentration and convergence of air-currents from the Indian Ocean on the one side and the Atlantic Ocean on the other. This is interesting because the source of the moisture for the summer rains of Abyssinia appears at one time to have been under discussion. In July however the wettest region in Africa, with some 15 inches of rain, is the Guinea coast; but in this instance the cause of the wetness is the meeting of the warm humid S.W. monsoon with a high coast at right angles, and not its meeting with the Harmattan, since the junction or "front" between the two currents then lies far inland where the rainfall is slight.

LOESS CAVERNS IN KANSAS

In *Amer. J. Sc.* Mr. Kenneth J. Landes describes caves of unusual origin occurring in Mitchell County, Kansas. A cavern composed almost entirely of loess, as well as two others whose roofs have fallen in leaving sink-holes, drains into a stream which has cut a steep narrow trench about 20 feet deep through the loess. No clue as to the origin of the formations was found until the loess bluff at the mouth of the cavern was closely examined. Then there was discovered a thin layer of limestone pebbles derived from nearby outcrops forming the country rock. Evidently percolating water used this relatively porous bed as a channel into the stream, dissolving the limestone pebbles as it passed through. The result was to form caverns of minute height, which subsequently became enlarged through the falling of loess from the roof and removal of debris by underground streams. In the case of the two sink-holes, the larger of which is about 200 feet long, 75 feet wide, and 18 feet deep, the falling of loess from the roof continued till the surface fell in, and similar subsidence above the present cave will inevitably take place. The formation of caves where such a very small proportion of the total rock is soluble is thought to be unique.

AN EARLY GERMAN SURVEYOR

Johann Heinrich Haas was a remarkable man who, with no advantages of birth or education, came to the fore in Germany as a surveyor and map-maker in the late eighteenth and early nineteenth century, but whose name is less known in modern times than it deserves to be. In the *Mitteilungen des Reichsamts für Landesaufnahme*, 8 Jahrgang, Nr. 4, Emilie Neunhöffer describes his life work in some detail, as pieced together from his letters, contemporary notices, and documents preserved in the State Archives at Darmstadt, which city formed the main centre of his activity. Haas came of very humble parents, and after receiving the scantiest of instruction at a village school, became a musketeer in a Darmstadt regiment when only fifteen. He bought such few books as his scanty pay allowed, and was fortunate in getting help in his self-imposed studies from the Rector of the garrison school, and afterwards from the instructor commissioned by the heir apparent of Hessen-Darmstadt (afterwards the Landgrave Ludwig X) to train promising youths for survey work. He soon out-distanced all his companions, and thenceforth most of his life was devoted to untiring work in the field, beginning with the Main and Rhine districts around Darmstadt and gradually extending his field of action in other directions. In 1788 he announced

as in preparation a 9-sheet map of the Darmstadt region on the large scale of 1/30,000, permitting the topography to be shown in great detail. For this, as for all his work, the basis was a careful triangulation, and he took great pains to link his surveys with those carried out in neighbouring regions. The wars of the time, in which he took part, offered many opportunities of extending his operations, though they delayed progress on his large-scale map, of which the second sheet only appeared in 1798, ten years after the first; the plan was also gradually extended so as eventually to comprise twenty-four sheets. The engraving of the terrain was nearly all done by a master in the craft, Johann Conrad Felsing, and this secured uniformity of style, though at the same time making the work slower than otherwise. In the earlier time one of Haas's best instruments was made by the Scot, Alexander Fraser, a pupil of Ramsden, but he was constantly seeking to better his methods, and eventually secured a good theodolite. Before this he had gained the co-operation of Christian Eckhardt, with whose aid a new triangulation was begun, a new astronomical determination of the situation of Darmstadt being also made, and a base carefully measured. In spite of liberal support from the Landgrave the work swallowed up all Haas's private means, and before his death at the age of fifty-two (brought about largely by the constant hardships entailed by his field-work) he became involved in debt, all his accumulated material being sold to satisfy his creditors and thus lost to the world.

THE MILTON ABBAS LAFRERI

We are pleased to learn that the collection of Italian maps which was an item in the Milton Abbas sale last year, and which was described in the *Journal* for December (p. 521), has found a new home in this country, having been secured by the Birmingham City Library through the generosity of Mr. W. A. Cadbury. Photostat copies of eight of the rarer maps and plans contained in the volume have been kindly presented to our Map-room by the City Librarian, who has also, by permission of the Society, secured photostats of such maps and views as are present in the Society's two Lafreri Atlases but not in the Milton Abbas collection. It would be interesting to discover whether any other copies of the Atlas, with the comparatively rare title-page indicating a contemporary origin of the collection, exist in this country. Those at the British Museum are without title-page, and the most extensive set of the maps there to be seen has, we believe, been assembled in its present form only in recent times.

AN APPROACH TO GEOGRAPHY

Dr. Hugh Robert Mill's presidential address to the Geographical Association, "An Approach to Geography," printed in *Geography*, March 1933, will be read with deep interest, not because it adds to the many attempts at a definition of geography, but for the precision and clarity of its review of the subject, illuminated by the knowledge and experience of a lifetime. Dr. Mill, returning to first principles, presents a picture of the world to-day compounded of the three "actual elements of geography," the lithosphere, the hydrosphere, and the atmosphere, subject to three manifestations of energy, the force of gravity, the internal heat of the Earth, and the radiation from the sun. Proceeding stage by stage, from the initial assumption of a smooth, bare, rigid lithosphere, he traces the effects of the interaction of these elements. Into this scheme of inorganic evolution, plant and animal life may be fitted without difficulty, and there may be observed "in these mobile distributions a wavering progress towards equilibrium and mutual adjustment."

The advent of man however introduces "new and harsher discords between environment and organism." In the past Dr. Mill sees a close control of the

mobility of mankind by the crust-forms, which it is now difficult to detect. But he does not limit this control to "mobility": for land forms were "potent influences in determining human societies and in impressing on the primitive mind characteristics which have become guiding principles in human progress." Though admitting that this still requires final proof, he is unable to doubt, and willing to accept it. Now however "the ancient tyranny of land over people" is passing, and man, whose "reaction on the economy of the world has grown from a jest to a serious menace," can either bring reason to the rescue of his future, or perish.

PRIZE FOR AN ESSAY ON A GEOGRAPHICAL SUBJECT

The Council of the Society have resolved to offer a prize of Ten Pounds annually for an Essay of not more than 5000 words: either a critical survey of recent additions to knowledge in a limited geographical field selected by the writer, or a discussion of some current problem in its geographical aspects. Competitors for the Prize must be registered Internal or External Students reading for Honours in Geography at one of the Universities of Great Britain and Northern Ireland during the academic year within which they submit their Essay. Essays must be submitted during the month of December, the award will be made not later than March 31, and the prize Essay will be published in the *Geographical Journal* for May or June following.

MEETINGS: SESSION 1932–1933

Twelfth Evening Meeting, 1 May 1933. The President in the Chair

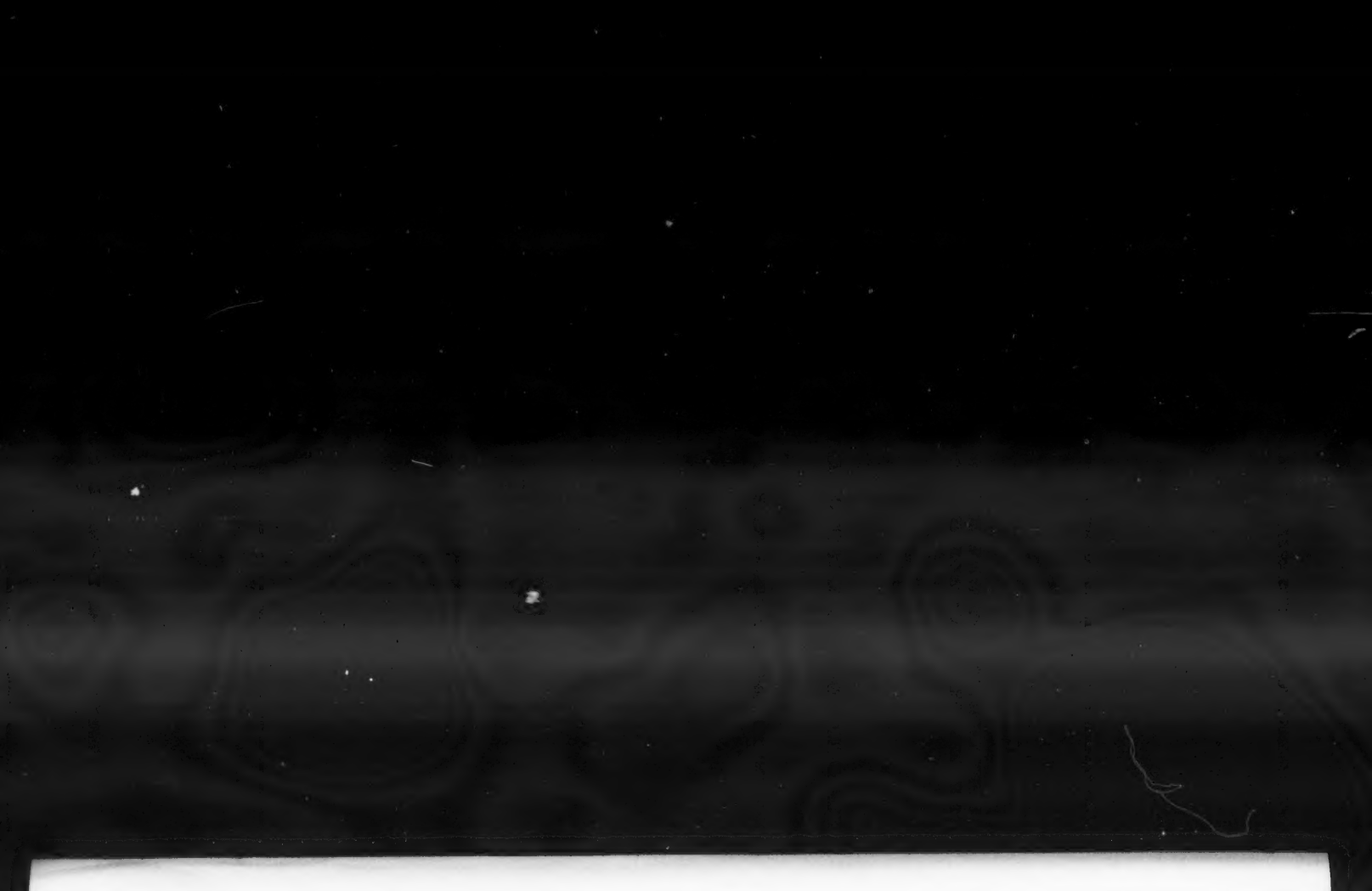
Elections: Mohammed Bashir, B.SC.; Miss Faith Mary Fry; Basil Blenman Harris, M.A.; George A. Knowlson, B.A.; Ernest Ralph Lapwood; Edward William Cresswell Luke; Mrs. Annie Y. Rieger-Hewitt; Lieut. Claude Edward Lutley Sclater, R.N.

Paper: Professor Gregory's Expedition to Peru. By Mr. A. V. Coverley-Price and Miss M. McKinnon Wood

Seventh Afternoon Meeting, 8 May 1933. The President in the Chair

Papers: Soil Erosion in Africa. By Mr. A. M. Champion. Soil Erosion: A Problem in Human Geography. By Mr. C. W. Hobley

Thirteenth Evening Meeting, 15 May 1933. The President in the Chair

Elections: Alan C. Browne; Sydney B. Chauntler; Jack Kenyon Dale, B.A.; Miss Elizabeth Harvey, B.SC.,; Leonard Thomas Higson; Charles Edward Key, M.A.; William LaVarre; Lieut.-Col. William McLellan, C.B.E., M.I.E.E.; Capt. R. Stuart Murray; The Rev. W. Lipscomb Orpwood, F.R.A.S.; Mrs. Christine E. G. Pascoe; Leonard Ross, F.C.A., F.S.A.A.; Cooper South; Mrs. Leslie Urquhart; Lao Htin Wah, I.F.S.; William James Waldron, J.P.; Miss M. Weld-Blundell; Lady Yule

Paper: The Geographical Work of H.R.H. the late Duke of the Abruzzi. By Professor Giotto Dainelli, Mr. J. M. Wordie, Sir Halford Mackinder, and Lord Conway